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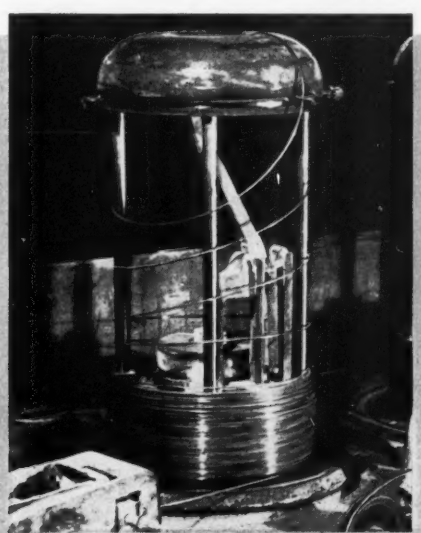

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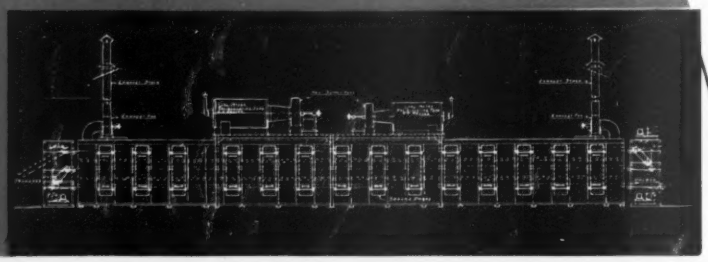

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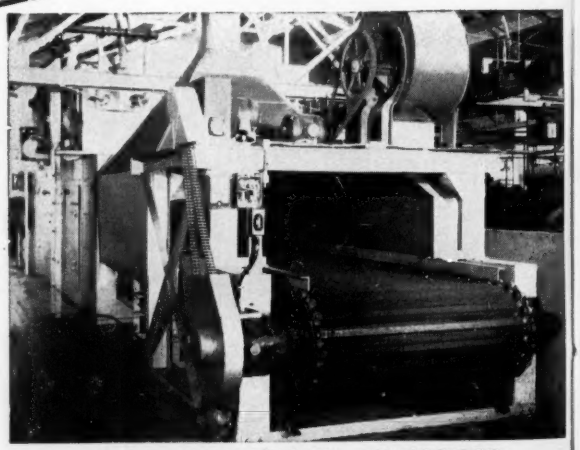

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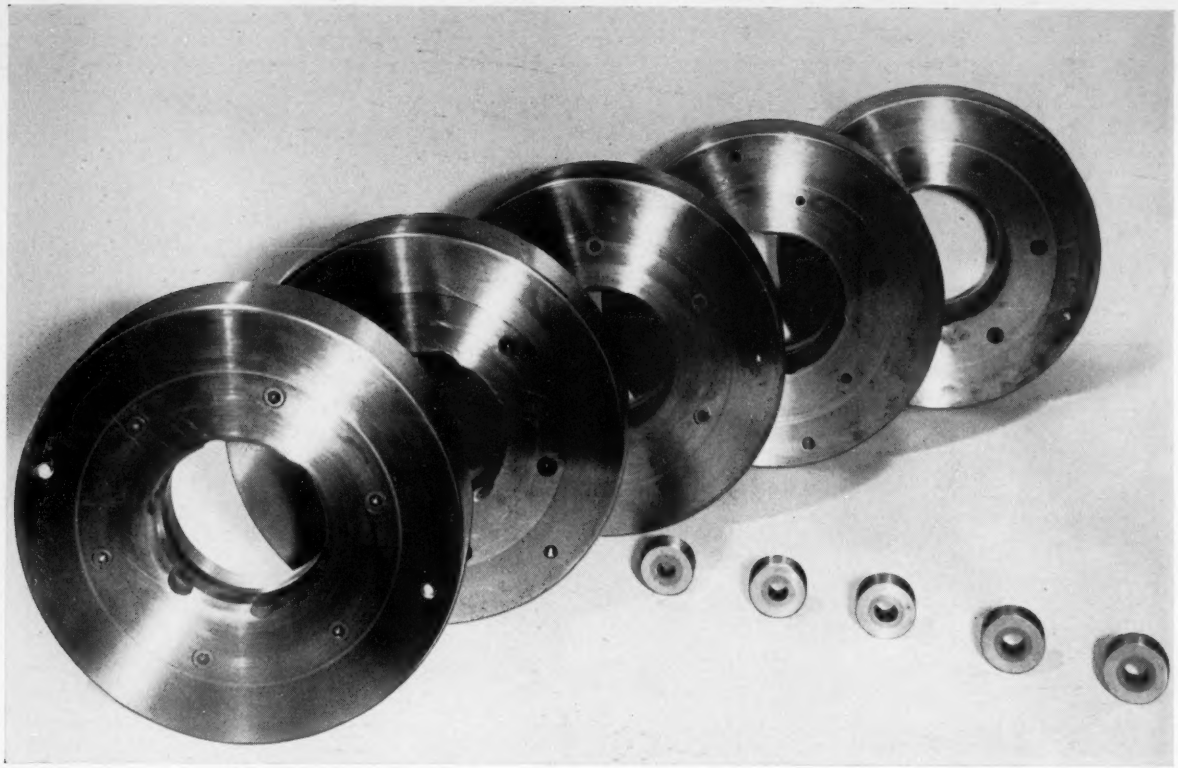

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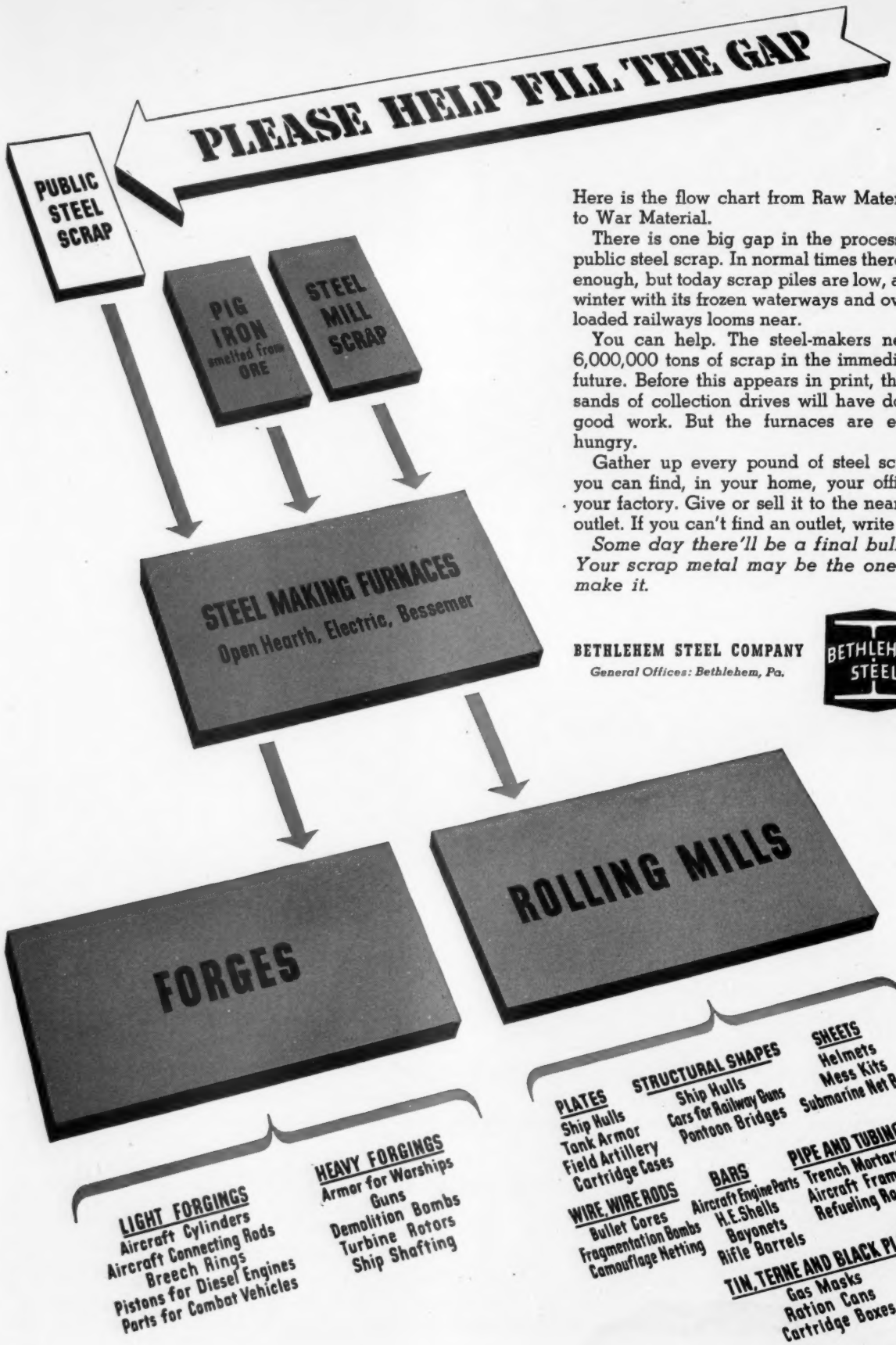

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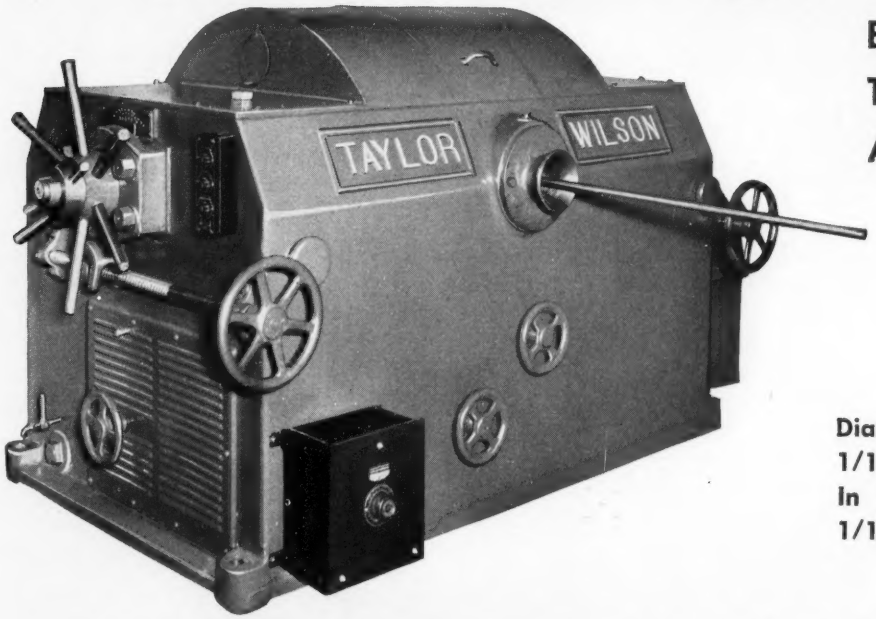

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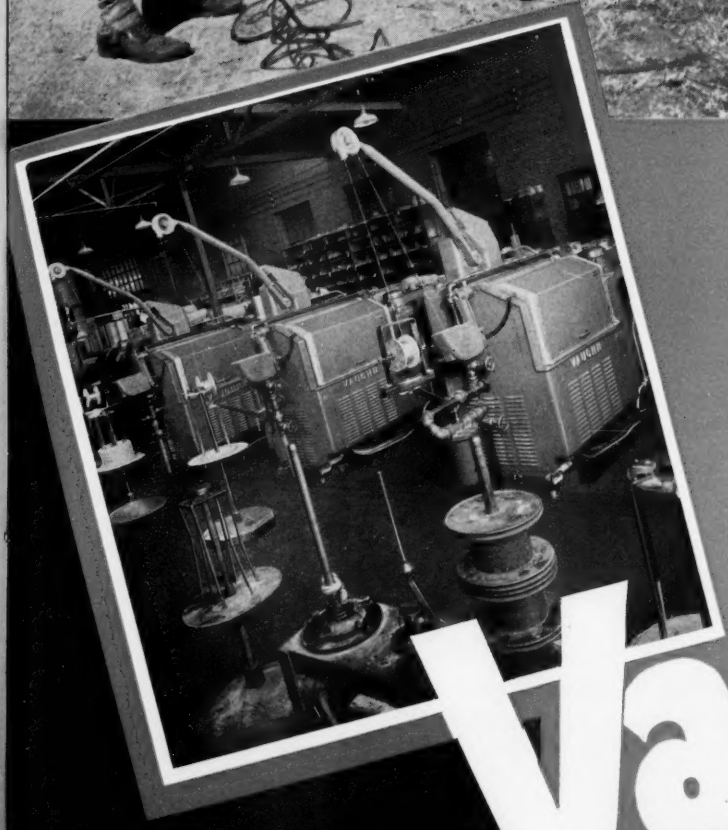

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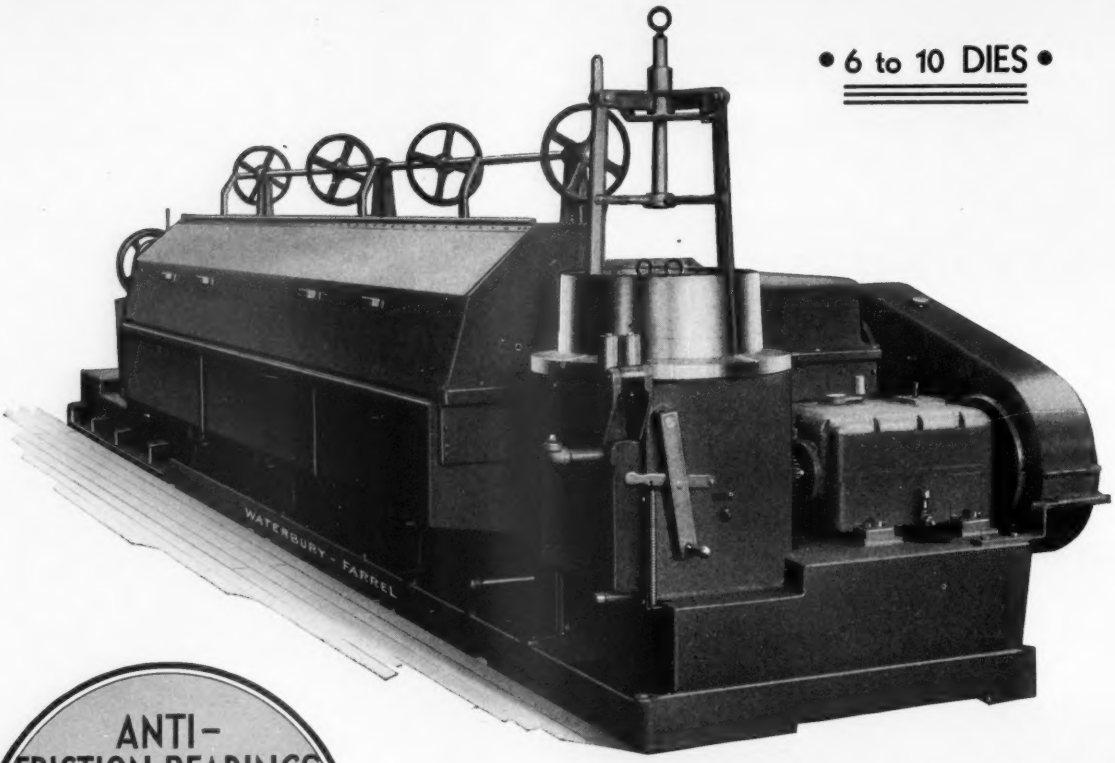

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 17 DECEMBER, 1942 No. 12

Designated as

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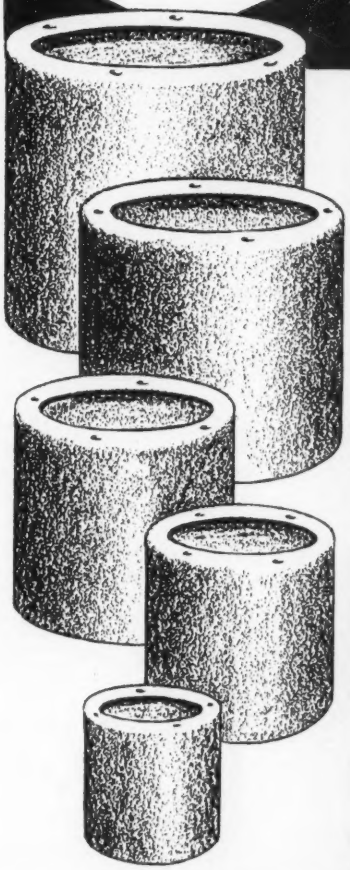

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A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 17 DECEMBER, 1942 No. 12

The Progress of the War

By Captain Melvin L. Payne, U. S. A.,
Bureau of Public Relations,
War Department,
Washington, D. C.

An address delivered before the Annual Luncheon of the Wire Association, held at the Hotel Carter, Cleveland, Ohio, October 13th, 1942. ✦ ✦ ✦ ✦

THE subject of my talk is "The Progress of the War."

✦ ✦ ✦

WE have been fighting more than 10 months now since Pearl Harbor, and if one of you were to ask: "How are we doing?" I would answer in this way:

1. **We are doing better than anyone had a right to expect.**
2. **We aren't doing well enough to get chesty.**

✦ ✦ ✦

THAT would be my answer on the basis of the available facts today. The picture isn't black. The picture isn't white. The picture is gray.

✦ ✦ ✦

TO be a little more specific, let me recall that when the Japs pulled their sneak attack on Hawaii, the United States Army numbered 1,600,000 men, the majority of whom had been in uniform less than a year.

✦ ✦ ✦

TEN months have passed. The last official announcement put the size of our Army at 4,000,000. Last May, General Marshall said the end of 1942 would find us with an Army of 4,500,000. That is progress you can't discount. Just between you and me, don't be too surprised when the next report on the Army's growth comes along.

✦ ✦ ✦

BUT why, in the aggregate, have we done better than anyone had a right to expect? The reason is simple. The Japs, Germans and Italians were better prepared on Dec. 7, 1942, than we were.

✦ ✦ ✦

SOUND preparation is the keystone of winning warfare. And—even now—we're still very much in the preparation stage. You can't haul off and win a war the way you haul off and fell a thug with one swift crack to the jaw. We wanted no part of this war, as witness our Neutrality Act. We were the peaceful passer-by when this thing hit us at Pearl Harbor. No war in all our history burst with the dismaying speed of this one. We were the ones who got the sudden crack on the jaw.

CAPT. MELVIN L. PAYNE, U. S. A.

Captain Payne was assigned by the office of the Under Secretary of War to represent the War Department as a speaker. Prior to entering military service, Captain Payne was engaged in engineering practice in the automotive field. He has been a platform speaker for many years and active in many well-known engineering associations.

Designated as Official Publication by the Wire Association

ON Nov. 11, 1918, when the Armistice was signed, the German military caste began to plan for the next war. They began to plot revenge. They took oath among themselves that in this next war Germany would reach her "place in the sun." The Nazis called it "lebensraum."

✦ ✦ ✦

UNDERGROUND military schools sprang up throughout the Fatherland and military literature flourished in the cellars. German officers studied their mistakes of 1914-18. They scattered to all parts of the world, spying, conniving, plotting.

✦ ✦ ✦

UNTIL 1933, they veiled most of this intrigue from the German public. But when Hitler took over from the hands of aging General Von Hindenburg, they gradually came above ground. The scheme of World War II began to take shape in the open. The Germans trained with wooden tanks and wooden planes. They unrolled the blueprints of another campaign of unrestricted U-boat warfare. They took American mass production techniques and adapted them to their warlike ends.

✦ ✦ ✦

BY the time of Pearl Harbor, Germany had an Army of 10,000,000. She had the productive capacity to support them. She had seized a European empire and was knocking at the gates of Moscow. The German war factories fed on the raw materials of looted lands while the German people feasted on the butter, eggs and cheese from helpless Denmark, the meats and wines from starving France, the foodstuffs snatched from the Dutch, the Belgians, the Poles.

✦ ✦ ✦

YES, the Nazis were doing better than all right when that Sunday at Pearl Harbor dawned. They had their victory-enthused army of 10,000,000 men. We had our Army of 1,600,000 and we were so bent on peace we proposed to muster out 200,000 of them who were over 28 years of age and let them go back home.

✦ ✦ ✦

TRUE. we had a good one-ocean Navy. We even contemplated making it a two-ocean Navy but there was no driving sense of urgency about the matter.

✦ ✦ ✦

THEN, while the Jap envoys talked peace at Washington, Tokio struck. On a Saturday night, we prepared for a defense. On a Sunday morning, in a blur of bursting bombs, we were catapulted into war to the East and war to the West. We had an Army of 1,600,000 and a one-ocean Navy. That's where we came in—10 months ago.

✦ ✦ ✦

FOR their part, the Japs had been getting ready for 40 years, since the Russo-Japanese War. First, they put the squeeze on China. They built a great naval base at Truk, out beyond Hawaii, to cut us off from the Philippines. In the greatest secrecy, their shipyards turned out aircraft carrier after aircraft carrier and their plane factories turned out Zero after Zero.

✦ ✦ ✦

THEY. not we, chose the hour of attack. It's a reasonable assumption they didn't strike before they considered themselves set. It's reasonable to believe that when they struck, they confidently expected to floor us for the count of ten. They hit us all right and we knew we were hit. But how did things shape up after that first haymaker left us reeling?

✦ ✦ ✦

THE Japs exploited their surprise blow to the full, yet the tribe of Moto must be sorely disappointed at Uncle Sam's resiliency and Uncle Sam's recuperative powers.

✦ ✦ ✦

THE Stars and Stripes still wave above Pearl Harbor and Pearl Harbor is the great barrier to any eastward aspirations of Japan. It's a higher, stouter barrier today than it has ever been since the first American bluejacket set foot in the Hawaiian Islands.

✦ ✦ ✦

ASSUREDLY, grievous losses followed Dec. 7, 1942—the long, disheartening succession of Hongkong, Wake Island, Singapore, the Philippines, the Dutch East Indies, Burma—but the grand prize escaped. Pearl Harbor stood.

SLOWLY, the tide began to turn with the Battle of the Coral Sea, turning the enemy back from Australia. And then came Midway when the Japanese made their greatest bid to break through our Pacific defenses. We welcomed them head-on and smashed their ships and their attack to pieces. History may place the Battle of Midway among the decisive battles of the world.

✦ ✦ ✦

SINCE then, we have taken the offensive ourselves. We have driven into the Solomon Islands and ousted the Japs from a strategic air base they were building with 2,000 imported coolies. They had seized upon the Solomons as a spot whereon to solidify themselves and their ceaseless efforts to wrest back their lost base show how they treasured it.

✦ ✦ ✦

IN adding up the score, let us not overlook the Doolittle raid on Tokio. It struck at the very center of the Rising Sun and it shook considerable self-confidence out of the Japanese people.

✦ ✦ ✦

IN a word, we have held the enemy at bay in the Pacific and even, in a small way, rocked him back on his heels.

✦ ✦ ✦

IN the Atlantic, we have fought a grueling struggle with the U-boats. Here, we have commanded the situation sufficiently to transport contingent after contingent of troops to foreign bases. Under Secretary of War Patterson said we had 600,000 soldiers overseas. That was a month ago. Troop ships haven't quit sailing since then.

✦ ✦ ✦

OUR Army Air Forces have been plastering the munitions factories of the Reich. Our planes and tanks are battering Rommel's army in the Middle East.

✦ ✦ ✦

ALL that is progress in the right direction—toward final victory. But is it sufficient progress to make us chesty? Most decidedly not!

✦ ✦ ✦

THE Japs are still in the Aleutians and the Aleutians are American soil. The Germans are

fighting their way deeper and deeper toward the heart of our ally, Russia.

✦ ✦ ✦

ONLY a major land offensive by the United Nations can shatter Hitler's empire. The cost in casualties will be enormous. We suffered 350,000 casualties in World War I. We had that many killed, wounded, missing, prisoners. Our casualties in this war may be 12 times our casualties in the last one. The price of victory is certain to be high. The harvest of Gold Star flags is certain to be heavy. Let us steel ourselves now.

✦ ✦ ✦

FOR the progress that we have made in this biggest of all jobs that our country ever undertook, you members of the Wire Association must get a measure of credit. The Armed forces must have wire to beat the Japs, Germans and Italians and you are the ones who fill that need.

✦ ✦ ✦

I SPOKE of the Solomon Islands where, for the first time in our 10 months of war, we took the offensive on land. Our ground, sea and air fighters combined to rout the enemy from that particular roost. I have jotted down ten instances where wire contributed to that success. Let me list them for you:

✦ ✦ ✦

1. **Wire went into the control cables of our attacking planes.**
2. **Wire went into the arresting gear that landed our planes back aboard their carriers.**
3. **The troops used wire slings, towlines and rigging to get their fieldpieces and heavy equipment ashore.**
4. **Wire went into the communications apparatus of the tanks that crawled up the beaches.**
5. **Our troops strung telephone lines of wire.**
6. **They erected barbed wire entanglements around their newly-won positions.**
7. **Wire went into the hoists with which our Air Forces loaded fresh bombs aboard their planes.**
8. **Wire went into the parachutes our fliers wore.**
9. **Wire stocked the field shops our men set up to repair disabled tanks, trucks and jeeps.**
10. **And last. Good, old American wire was used to fence in a batch of captured Japs.**

✦ ✦ ✦

IF anyone thinks wire isn't important to the American cause today, let him consider only the three feet of wire used in every parachute that's strapped over the shoulders of a U. S. Flier. It's the trigger of the chute, the heart of the whole business. It's part of the rip cord, the gadget with a handle hanging over the flier's left chest. When a man bails out of a burning plane and gives that handle a yank, the wire in there better be up to specifications. If it snaps, there's another dead flier. It might be your boy or mine who's dropping up there from 20,000 feet and that parachute is all there is between him and the hereafter.

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BUT from the cold, military standpoint alone, just how expendable are our crack, seasoned pilots?

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JUDGING from the history of the last war, every ace we lose means incalculably more than the death of just one more fighting American. Two hundred allied pilots accounted for 50 per cent of Germany's air losses in the last war and she suffered the destruction of 6000 planes. Two hundred men destroyed 3000 planes.

✦ ✦ ✦

IN this war, when air power is a basic requisite, we cannot afford to lose the flower of our Air Forces. They are too precious. So we protect them with armor and leakproof tanks and every other known safeguard.

THE Japs, with less regard for the lives of their fliers, aren't so careful. One good burst of machine gun fire and a Jap Zero flies apart like a bursting rocket. We are noting a distinct deterioration in the quality of Jap pilots. Many of their best fliers have been killed off. This is one thing that will contribute to Japan's loss of the war. And it is quite all right with us.

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OUR aim is to crush the enemy, crush him in the quickest possible time and crush him with the least punishment to ourselves. If he drives a nail in his own coffin, so much the better.

✦ ✦ ✦

TWO weeks ago today Hitler made a speech in the Berlin Sportspalast. To my mind, he let the cat out of the bag when he made that speech. I want to quote just four of his words. "We shall never capitulate," said the almighty Adolf. Always, before, he has talked of conquest, expansion, "lebensraum." One year ago he said "the enemy is already broken and will not rise again." Now, for the first time, he speaks of defeat and surrender. He says the Nazis will never give in.

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GERMANY said that before, too, but she quit cold 24 years ago next month. You veterans of 1917-18 who are in this audience helped make her quit.

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DON'T mistake me. I am not saying that victory is around the corner. I am not even saying victory is assured, but I do say we have got Hitler to the point where he is at least talking about the white flag instead of the swastika.

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THAT, I submit, is progress.

The Discussions at The Wire Association Meetings Will Be Published in Detail in the January, 1943 Issue of Wire and Wire Products.

✦ These Discussions — In Connection With the Published ✦
✦ Papers Will Contain Information of Great Value To All ✦
✦ Wire Production Men — Be Sure To Secure A Copy. ✦

The Physical Properties of Steel Wire As Affected by Variations in the Drawing Operations

By Howard J. Godfrey[1]

Synopsis

This investigation was carried out on 0.67 per cent carbon patented wire drawn 40, 30, 20, and 10 per cent reduction per draft, and a 0.27 per cent carbon patented rod drawn 40, 30, and 20 per cent reduction per draft. The physical tests, which included tension, torsion, bending and bending fatigue, were made at a number of stages of wire drawing from the patented condition to 97 per cent reduction. The physical properties of hand-straightened and machine-straightened wire were compared. The tensile strength and bending properties were found to be changed considerably by the method of wire drawing. The lower rates of drafting resulted in improved bending properties and lower tensile strength. The physical properties of the 0.67 per cent carbon material were affected to a greater extent by the rate of drafting than the 0.27 per cent carbon wire. In general the elongation and reduction of area as determined in the tension test were improved by a low rate of drafting. The fatigue properties were affected by the rate of drafting in the same manner as the tensile strength. The number of bends and type of fracture obtained in the bend test are believed to be a measure of the toughness of steel wire. The amount of wire drawing that resulted in the best combination of strength, ductility, toughness, and fatigue properties was between 75 and 80 per cent reduction. ✦ ✦ ✦ ✦

THE influence of variations in the drawing operations on some of the physical properties of steel wire has long been appreciated by the wire industry. The purpose of this investigation was to study in detail the physical properties of wire drawn according to a number of drafting schedules and to correlate the physical properties as determined by various types of test methods. The method of wire drawing resulting in the best combination of physical properties could then be established.

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THE tension and torsion tests are usually employed to govern the quality of finished wire. In order to provide additional information as to the quality of wire, another method of testing was developed. First suggested by **Bonzel** (1)[2] in his book **"Steel Wire,"** a bend test was described in a previous paper (2) which when properly made seemed to indicate the toughness of steel wire. The further development of this bend test has been included in this investigation.

Materials

TWO materials were used, a 0.67 per cent and a 0.27 per cent carbon steel, the chemical compositions of which are presented in Table I. This analysis was made on samples of patented material from which the wire was drawn.

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ALL of the 0.67 per cent carbon wire came from one coil of ¼-in. diameter hot-rolled rod which was drawn to 0.218 in. in diameter and double lead patented at 1550 to 900 F. This patented wire was then drawn 40, 30, 20, and 10 per cent reduction per draft. For the 40 per cent group, only two sizes were supplied since breakage occurred during wire drawing on the third draft. The 0.27 per cent carbon wire was drawn 40, 30, and 20 per cent reduction per draft from a 0.220-in. diameter patented rod. A number of sizes of wire representing each rate of drawing were furnished by the wire mill in both coils and machine straightened.

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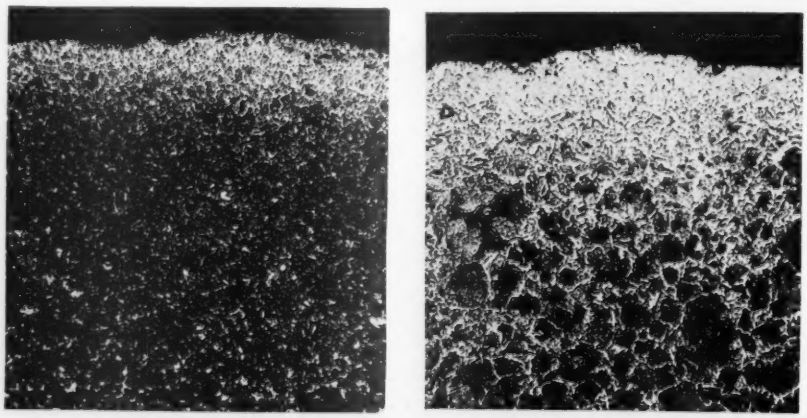
THE microstructure of the 0.67 per cent carbon and 0.27 per cent carbon steel after the patenting heat treatment are shown in Fig. 1. At the surface of both of these patented materials there is a distinct decarburized layer. Since all the wire of a given carbon content was drawn from the same coil, the effect of the decarburized surface would be the same throughout. Any differences in the physical properties could therefore be attributto the method of wire drawing.



0.67 per cent Carbon — 0.27 per cent Carbon

Fig. 1. Patented Structure of 0.67 per cent and 0.27 per cent Carbon Steel (X 100). ✦ ✦

[1]Development Engineer, John A. Roebling's Sons Co., Trenton, N. J.

[2]The boldface numbers in parentheses refer to the reports and papers appearing in the list of references appended to this paper.

This paper was presented at the Forty - fifth Annual Meeting of the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa., held at Atlantic City, N. J., June 22-26, 1942. Published by permission of The American Society for Testing Materials.

Methods of Testing

THE tension tests were carried out on a 60,000-lb. capacity Baldwin-Southwark hydraulic testing machine and a 2000-lb. capacity Amsler hydraulic testing machine. The tensile strength, elongation in 10 in., and the reduction of area were determined. On some of the tension specimens the ductility indices as described by **MacGregor** (3) were also determined. The ductility indices separate the uniform and necking phases which occur during the tension test. The uniform strain occurs between zero load and maximum load, and the necking strain occurs between the maximum load and the breaking load. The uniform ductility index I_u and the necking ductility index I_n are determined from the following equations:

$$\text{Uniform ductility index } I_u = \log \frac{A_o}{A_u}$$

$$\text{Necking ductility index } I_n = \log \frac{A_u}{A_b}$$

where:

A_o = minimum area at zero load,
A_u = minimum area at maximum load, and
A_b = minimum area after fracture.

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THE above values may be obtained by measuring the least diameter of the test specimens at the three stages of the test.

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THE torsion test, as a routine test, often as an acceptance test, is peculiar to the wire industry. The torsion tests were made using a gage length equal to 100 wire diameters and a speed of testing of 60 twists per minute with a tension on the specimen equal to approximately 1 per cent of the tensile strength.

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THE bending tests on the 0.67 per cent carbon wire were carried out on a wire-bending machine as described in a previous paper (2). The bend tests on the 0.27 per cent carbon wire were made on another machine of more recent design. A photograph of the latter bend testing machine is shown in Fig. 2. Fundamentally, the two bend test machines are identical and tests made using the two machines on the same material gave the same results. The test, on either machine, consists of bending the wire specimen back and forth over rolls by moving the bending arm through an angle of 180 deg. until fracture occurs. The wire is held in a grip attached to the bending arm and weights are suspended from the lower end of the wire. The amount of tensile stress on the wire specimen due to the suspended weights is 1 per cent of the tensile strength of the wire. The center of rotation of the bending arm is adjustable for any diameter roll and is set at a point 0.7 R above the centerline of the rolls, where R = radius of the rolls. In this position the vertical movement of the wire during the test is held to a minimum. In order to correlate the bending properties of wires of different diameters, the ratio between the roll diameter and the wire diameter should be the same. A roll diameter-wire diameter ratio of 10 was used in these experiments. If a lower ratio than 10 is used, the number of bends decreases and it becomes difficult to differentiate between the bending properties. A larger ratio would only serve to prolong the length of the test. Whenever rolls of exactly 10 wire diameters were not available, tests were made on two sets of rolls of the approximate size and the values interpolated for the ratio of 10. The number of 180-deg. reverse bends necessary to fracture the wire and the type of fracture are believed to indicate the toughness of wire.

TABLE I—CHEMICAL COMPOSITION OF STEEL

Carbon, per cent	Manganese, per cent	Phosphorus, per cent	Sulfur, per cent	Silicon, per cent
0.67	0.84	0.021	0.027	0.19
0.27	0.50	0.014	0.131	Trace

Fig. 2. Bend Testing Machine for Wire.

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THE fatigue tests were made on two wire fatigue machines (2) designed on the principle of a rotating wire strut and similar to the Haigh-Robertson wire fatigue machine. A number of check tests were also made on a Haigh-Robertson machine and the results were the same as those obtained on the two other machines. In brief, the wire specimen is stressed as a rotating wire strut and the stresses are computed from the "Euler" column formula. The maximum bending stress at the mid-length of the specimen is equal to:

$$f = \frac{\pi^2}{360} \theta \frac{d}{L} E$$

where:

f = bending stress in pounds per square inch.
θ = inclination at end of specimen in degrees,

d = diameter of wire in inches,
L = length of wire in inches, and
E = modulus of elasticity in pounds per square inch.

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SINCE the maximum stress occurs at the center of the specimen, all fractures occur at this point, thereby providing a method of fatigue testing in which the gripping devices have no effect on the test results. The specimen for a fatigue test must be straightened before testing; otherwise vibrations will be set up during the test. The tensile properties of the wire used for the fatigue tests were changed by the machine-straightening operation. However, a number of tests were made comparing the fatigue properties of machine- and hand-straightened wire and in all cases the results were within the normal variation of this material. The modulus of elasticity was assumed to be 30,000,000 psi. for all the material tested.

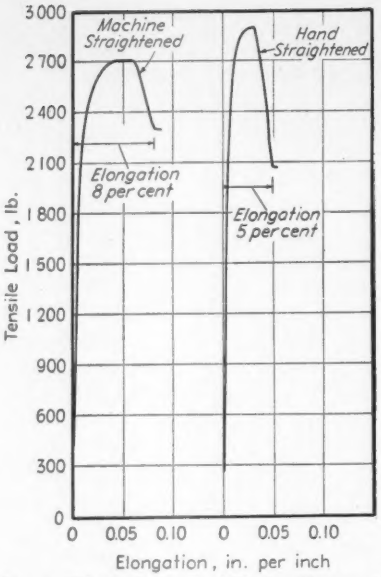

Fig. 3. Effect of the Straightening Process on the Tensile Properties of 0.67 per cent Carbon Steel Wire, diameter = 0.129. in.

TABLE II—TENSILE STRENGTH AND ENDURANCE LIMIT OF HAND- AND MACHINE-STRAIGHTENED WIRE

Material	Diameter, in.	Draft	Tensile Strength psi. Hand	Tensile Strength psi. Machine	Endurance Limit, psi. Hand	Endurance Limit, psi. Machine
0.67 per cent carbon	0.218	Rod	161 000	158 000	35 500	37 000
	0.169	1	201 000	185 000	52 000	49 000
	0.1315	2	230 000	216 000	59 000	60 000
0.27 per cent carbon	0.1025	3	143 000	133 000	52 000	54 000
	0.079	4	164 000	153 000	56 000	58 000
	0.0615	5	182 000	175 000	62 000	62 000
	0.0468	6	211 000	206 000	66 000	68 000
	0.0368	7	244 000	237 000	72 000	74 000

✦ ✦ ✦

Test Results

Effect of Straightening Process

IN general the tensile strength of the machine-straightened wire is less than that of the hand-straightened material and the loss in strength due to the machine-straightening process diminishes as the size of the wire decreases.

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EXAMPLES of the effect of the straightening process are shown in Fig. 3, where autographic load-elongation curves of a 0.67 per cent carbon wire are presented. The tensile strength has been reduced by the machine-straightening operation but at the same time the elongation has been increased considerably. The effect of the straightening process on the tensile strength of the 0.67 per cent and 0.27 per cent carbon wire drawn 40 per cent per draft is shown in Table II.

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THE fatigue properties of both hand and machine-straightened material are also presented in Table II. These tests indicated that the endurance limit could be determined on the machine-straightened wire with the necessary accuracy even though the tensile strength of this material was somewhat lower than the hand-straightened material. All other fatigue properties reported in this paper were therefore determined on machine-straightened wire.

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Tensile Strength

THE effect of the rate of drawing on the tensile strength of the 0.67 per cent and 0.27 per cent carbon wire is shown in Fig. 4. The amount of cold working is expressed by the percentage reduction of area by wire drawing and is determined from the following equation:

$$\text{Percentage Reduction of Area} = \frac{A_o - A_f}{A_o} \times 100$$

where:
A_o = initial area of patented material, and
A_f = area of cold-drawn wire at any stage of wire drawing.

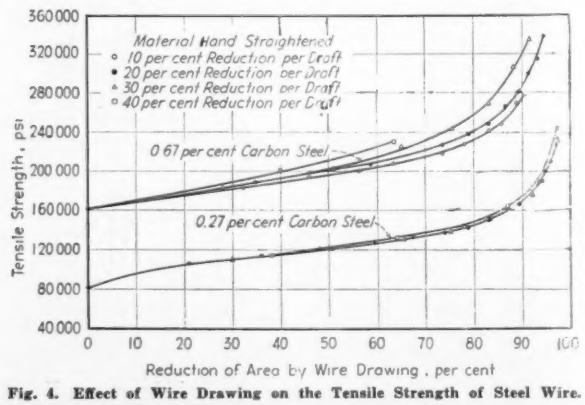
Material Hand Straightened
10 per cent Reduction per Draft
20 per cent Reduction per Draft
30 per cent Reduction per Draft
40 per cent Reduction per Draft
0.67 per cent Carbon Steel
0.27 per cent Carbon Steel
Tensile Strength, psi
360 000
320 000
280 000
240 000
200 000
160 000
120 000
80 000
40 000
0 10 20 30 40 50 60 70 80 90 100
Reduction of Area by Wire Drawing, per cent

Fig. 4. Effect of Wire Drawing on the Tensile Strength of Steel Wire.

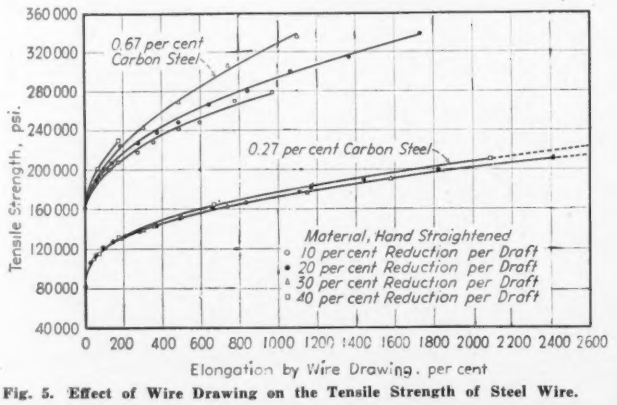
0.67 per cent Carbon Steel
0.27 per cent Carbon Steel
Material, Hand Straightened
10 per cent Reduction per Draft
20 per cent Reduction per Draft
30 per cent Reduction per Draft
40 per cent Reduction per Draft
Tensile Strength, psi.
360 000
320 000
280 000
240 000
200 000
160 000
120 000
80 000
40 000
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600
Elongation by Wire Drawing, per cent

Fig. 5. Effect of Wire Drawing on the Tensile Strength of Steel Wire.

Using the above expression as a measure of the amount of wire drawing we find that the rate of increase in tensile strength is greatest in the latter stages of wire drawing.

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THE effect of the rate of drawing on the 0.67 per cent carbon wire is very definite. A higher rate of drawing produces a higher tensile strength for any given amount of wire drawing. The effect of the rate of drawing on the 0.27 per cent carbon wire was rather small, the material drawn 40 per cent reduction per draft being only slightly stronger than the material drawn 20 and 30 per cent reduction per draft.

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BONZEL (1) has suggested that the amount of cold working by wire drawing could be expressed by the percentage elongation. This value is computed by the following equation:

Percentage Elongation

$$= \frac{A_o - A_f}{A_f} \times 100$$

The above equation expresses the percentage increase in the length of the original wire. The tensile strength is related to the percentage elongation by wire drawing in Fig. 5. In this relationship, the rate of increase in strength is greatest during the initial stages of wire drawing, in direct contrast to Fig. 4, where the tensile strength is related to the reduction of area. The effect of the rate of drawing, however, is not changed by this method of expressing the amount of cold working.

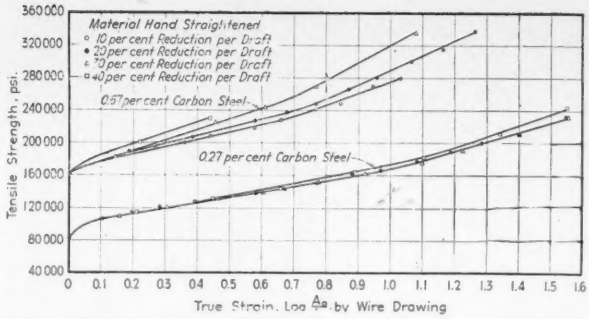
Material Hand Straightened
10 per cent Reduction per Draft
20 per cent Reduction per Draft
30 per cent Reduction per Draft
40 per cent Reduction per Draft
0.67 per cent Carbon Steel
0.27 per cent Carbon Steel
Tensile Strength, psi.
True Strain, Log $\frac{A_o}{A_f}$ by Wire Drawing

Fig. 6. Effect of Wire Drawing on the Tensile Strength of Steel Wire.

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A THIRD method of expressing the amount of cold working by drawing is presented in Fig. 6, where the tensile strength is related to the true strain. The equation for the amount of maximum true strain or true reduction of area in a simple tension test for a uniform cross-section is expressed by **MacGregor** (3) as follows:

$$\text{Maximum True Strain } \varepsilon = \log \frac{A_o}{A_f}$$

In the tension test it has been found that the true stress-strain

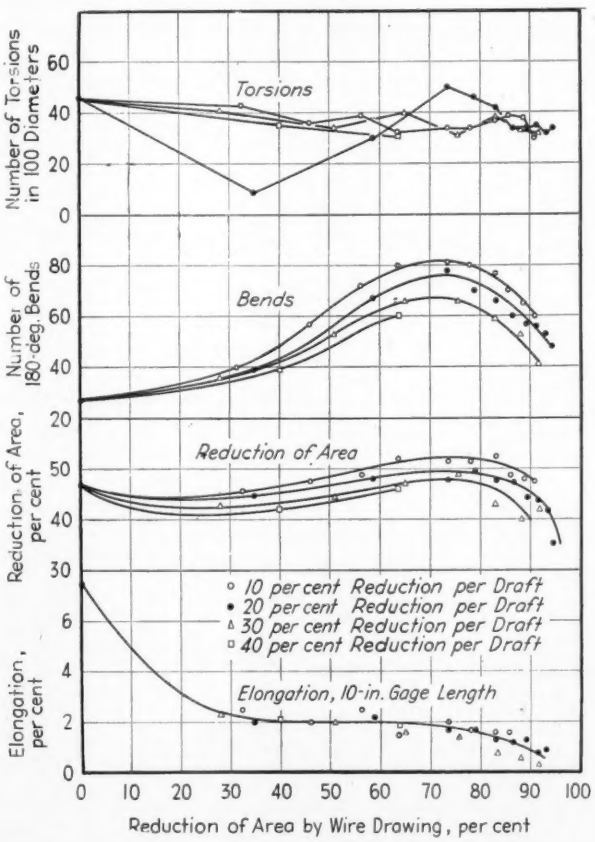
Torsions
Number of Torsions in 100 Diameters
Bends
Number of 180-deg. Bends
Reduction of Area
Reduction of Area, per cent
10 per cent Reduction per Draft
20 per cent Reduction per Draft
30 per cent Reduction per Draft
40 per cent Reduction per Draft
Elongation, 10-in. Gage Length
Elongation, per cent
Reduction of Area by Wire Drawing, per cent

Fig. 7. Effect of Wire Drawing on Torsions, Bends, Reduction of Area, and Elongation of 0.67 per cent Carbon Steel Wire, Hand Straightened. ✦ ✦ ✦ ✦ ✦

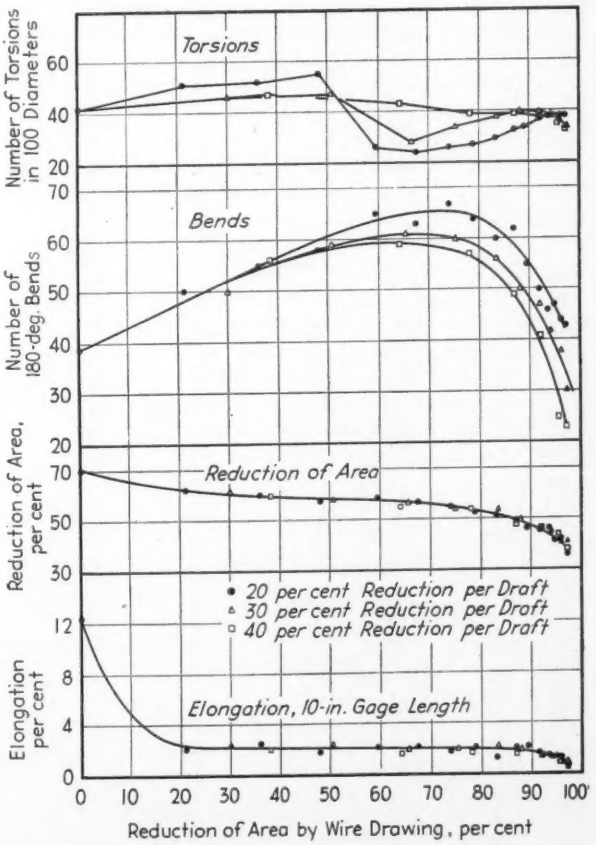
Torsions
Number of Torsions in 100 Diameters
Bends
Number of 180-deg. Bends
Reduction of Area
Reduction of Area, per cent
20 per cent Reduction per Draft
30 per cent Reduction per Draft
40 per cent Reduction per Draft
Elongation, 10-in. Gage Length
Elongation, per cent
Reduction of Area by Wire Drawing, per cent

Fig. 8. Effect of Wire Drawing on Torsions, Bend, Reduction of Area, and Elongation of 0.27 per cent Carbon Steel Wire, Hand Straightened. ✦ ✦ ✦ ✦ ✦

curve becomes a straight line from the value of the average true stress corresponding to the maximum load up to the breaking load. This would mean that the amount of work hardening done during the necking down period in the tension test is proportional to the maximum true strain. Since the drawing of wire may be comparable to the action which takes place in the necking down period in the tension test, the above equation might be suitable criterion for the expression for the amount of cold work done by wire drawing. In Fig. 6 the tensile strength increases in direct proportion to the amount of true strain up to a certain amount of drawing, after which the tensile strength increases at a somewhat greater rate in the latter stages of wire drawing.

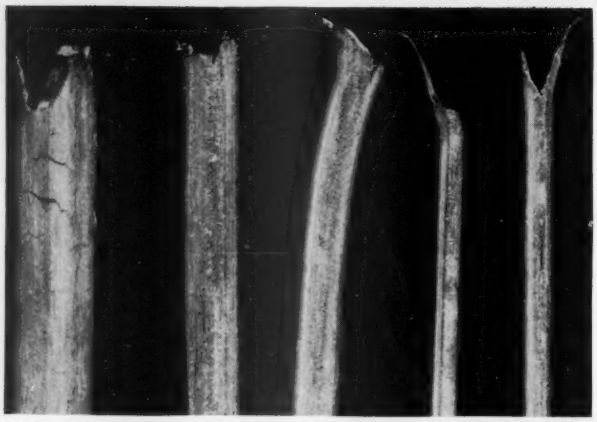

Fig. 9. Bend Test Fractures of 0.67 per cent Carbon Wire Drawn 20 per cent Reduction per Draft.
(a) 58.6 per cent (b) 78.9 per cent (c) 86.5 per cent (d) 94.5 per cent
Percentage Reduction by Wire Drawing.

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Elongation, Reduction of Area, Torsion and Bending

THE effect of the rate of drawing on the elongation in 10 in., reduction of area, torsion, and bending properties of the 0.67 per cent and 0.27 per cent carbon wire is presented in Figs. 7 and 8, respectively. For the 0.67 per cent carbon wire the lower rate of drawing resulted in higher elongation, particularly in the latter stages of wire drawing. The difference, however, was not very marked. The effect of the rate of drawing on the elongation of the 0.27 per cent carbon wire was negligible.

THE reduction of area of the 0.67 per cent carbon wire was affected to a large degree by the rate of drawing but no differences could be found on the 0.27 per cent carbon wire. The lower rates of drawing on the high-carbon wire resulted in a higher reduction of area. The total amount of wire drawing had a decidedly different effect on these two materials. The reduction of area of the 0.67 per cent carbon wire first decreased and then increased with wire drawing up to about 75 per cent reduction and then decreased rapidly. The reduction of area of lower carbon material, however, gradually decreased with wire drawing up to about 80 per cent reduction, after which the ductility decreased rapidly.

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THE results of the torsion tests, Figs. 7 and 8, show that except for one specimen, all of the 0.67% carbon material had at least 20 torsions in 100 wire diameters. The amount of drawing and the total amount of wire drawing did not have any consistent effect on the torsional properties.

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THE bending properties of the 0.67 per cent and 0.27 per cent carbon steel wire are also presented in Figs. 7 and 8. A decrease in the rate of drawing on the 0.67 per cent carbon wire resulted in a considerable improvement in the bending properties. The drawing schedule did not have such a marked effect on the 0.27 per cent carbon wire except in the latter stages of wire drawing. The bending properties improved with wire drawing up to about 72 per cent reduction and then decreased very rapidly. The characteristics of the fracture obtained in the bend test also indicated the toughness of the material. Figure 9 shows a number of bend test fractures obtained on the 0.67 per cent carbon wire drawn 20 per cent per draft. Specimens *a* and *b*, which were cold drawn to a total of 58.6 per cent and 78.9 per cent reduction, respectively, have rather stubby fractures. Specimen *c*, drawn 86.5 per cent reduction, has a long slivery fracture with a tendency to form longitudinal cracks. Specimens *d*, drawn 94.5 per cent reduction, have a decided tendency to fracture in the longitudinal direction. The 0.27 per cent carbon wire had only a slight tendency to split in the longitudinal direction even though it was cold drawn more than the high-carbon wire.

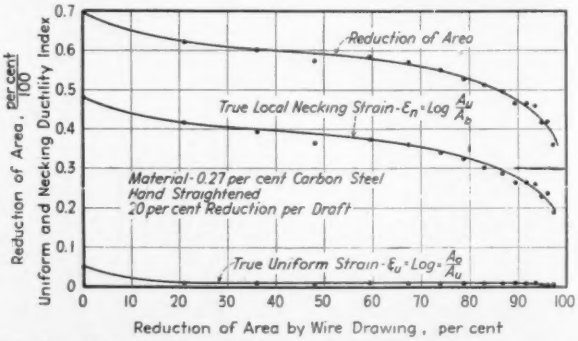
Reduction of Area
True Local Necking Strain - ϵ_n = Log $\frac{A_u}{A_b}$
Material - 0.27 per cent Carbon Steel
Hand Straightened
20 per cent Reduction per Draft
True Uniform Strain - ϵ_u = Log = $\frac{A_o}{A_u}$
Reduction of Area, $\frac{\text{per cent}}{100}$
Uniform and Necking Ductility Index
Reduction of Area by Wire Drawing, per cent

Fig. 10. Effect of Wire Drawing on the Ductility Indices. ✦

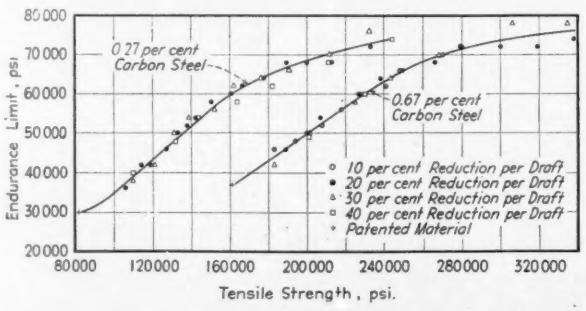
0.27 per cent Carbon Steel
0.67 per cent Carbon Steel
10 per cent Reduction per Draft
20 per cent Reduction per Draft
30 per cent Reduction per Draft
40 per cent Reduction per Draft
Patented Material
Endurance Limit, psi
Tensile Strength, psi.

Fig. 11. Relation Between Endurance Limit and Tensile Strength of Steel Wire. ✦ ✦ ✦ ✦ ✦

IN order to investigate further any other possible means by which to determine more accurately a true measure of the physical characteristics of wire, a number of measurements were made during the tension test to determine the true measure of ductility as expressed by **MacGregor** (3). An example of the results of these measurements are presented in Fig. 10 where the true uniform strain and true necking strain are compared to the usual reduction of area values for the 0.27 per cent carbon wire drawn 20 per cent per draft. The uniform strain for cold-drawn steel wire is found to be a small percentage of the true maximum necking strain. It should be noted that the uniform strain is practically a constant for the cold-drawn wire whereas the necking strain decreases gradually with wire drawing and the curve is very similar to the reduction of area curve. This true necking strain for the 0.67 per cent carbon wire was also proportional to the reduction of area as determined by the tension test.

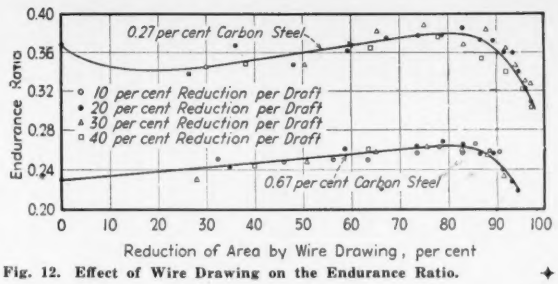

Fig. 12. Effect of Wire Drawing on the Endurance Ratio.

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Fatigue Tests

THE relation between the fatigue and tensile properties is presented in Fig. 11. These results show that for the same tensile strength the lower carbon material has a considerably higher endurance limit. For an endurance limit of 60,000 psi., the tensile strength of the 0.27 per cent carbon wire is only 160,000 psi., as compared to 230,000 psi. for the 0.67 per cent carbon wire even though both materials were definitely decarburized. The effect of wire drawing on the endurance ratio is presented in Fig. 12. As previously shown, the endurance limit of the hand-straightened wire was practically the same as that of the machine-straightened wire. The endurance ratio was therefore calculated by dividing the endurance limit of the machine-straightened wire by the tensile strength of the hand-straightened wire. The endurance ratio increases very gradually up to approximately 80 per cent reduction by wire drawing and then decreases rapidly. Since the endurance ratio is approximately the same for each drawing schedule, the endurance limit is affected by the rate of drafting in the same manner as the tensile strength.

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Discussion of Test Results

Effect of Straightening Process

THE method used in straightening wire was found to have a marked effect on the tensile properties. The tensile strength of the machine-straightened wire was less than that of the hand-straightened material but the ductility as measured by the elongation was improved. The above effects were more pronounced on the larger diameter wires. This indicates that the loss in strength and increase in ductility might be due to the reverse bending which takes place in the rotary machine straightener. Since the endurance limit is only a relatively small percentage of the tensile strength, it was not affected by the loss in strength of the machine-straightened wire.

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Tensile Strength

THE tensile strength of steel wire was in general higher as the rate of drawing increased. The higher rates of drafting have a greater effect on the total cross-section of the wire, and result in a greater strain hardening. The amount of heat generated in the die would also be greater for the higher rates of drawing and this increase in temperature would tend to raise the tensile strength of the wire. Temperature would also account for the small effect of the rate of drawing on the tensile strength of the low-carbon wire. **Püngel and Hünlich** (4) have found that up to approximately 250 C. a 0.66 per cent carbon cold-drawn steel wire will increase in tensile strength.

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THE most accurate method of representing the amount of wire drawing is probably by true strain. Using this as a measure, the tensile strength after the first reduction increases in direct proportion to the amount of wire drawing. If this straight-line relationship holds true for all cold-drawn wire it would be quite advantageous to use the relationship to determine the amount and method of drawing to obtain the necessary tensile strength of a finished wire. The change in the rate of increase in tensile strength in the final stages of wire drawing might be explained by the increase in the amount of preferred orientation (2). Since the crystal orientation is such that the face diagonal of the cube, that is the [110], lies parallel to the wire axis, a change in the rate of increase in strength would be expected.

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Ductility

THE rate of drawing had considerably more effect on the elongation and reduction of area of the high-carbon than the low-carbon wire. The reason for this might also be explained by the temperature effect during wire drawing. The increase in the ductility with a decrease in the rate of drawing may also be due to the more uniform deformation which would take place within the wire-drawing die.

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Torsion

THE rate of drawing and the amount of wire drawing did not have any consistent effect on the torsion test results. The torsion test is probably affected by the general fibering of the grains and the surface condition of the wire. The test results, however, show that the surface condition of the material was apparently good even after an extreme amount of wire drawing. The decarburized surface of the material may also have a decided effect on the torsional properties.

Bending

THE bending properties were found to be more sensitive to the rate of drawing than any other measure of the physical characteristics of steel wire. Even though the ductility of the 0.27 per cent carbon wire was not changed materially by the rate of drawing, the bending properties were definitely affected. The improvement in the bending properties by a low rate of drawing may be attributed to a more uniform fibering of the grains as a whole. The fact that the number of bends decrease after approximately 72 per cent reduction by wire drawing indicates that the beneficial effect of the initial fibering is being offset by the loss in ductility and by the directional properties which are characteristic of materials which have excessive preferred orientation. The type of fracture obtained in the bend test on wire also indicates that longitudinal planes of weakness are formed in wire as the amount of wire drawing exceeds certain limits.

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Fatigue

THE fatigue properties of the 0.67 per cent and 0.27 per cent carbon wire were considerably lower than would be found on a wire free from decarburization. From previous tests (2), the endurance limit of a 0.67 per cent carbon wire free from decarburization should have been approximately 32 per cent of the tensile strength instead of 25 per cent. The lower endurance limit of a decarburized material is due to the fact that the maximum bending stresses on the fatigue specimen occur at the surface of the wire where the strength of the wire due to decarburization is at a minimum. The decarburization of the 0.27 per cent carbon wire would have less effect on its fatigue properties since the difference in strength of the decarburized surface and the strength of the core of the wire would be less. The rapid drop in the endurance ratio after approximately 80 per cent reduction by wire drawing may be due to the variation in tensile strength over the cross-section of the wire. The greatest amount of preferred orientation has been found to occur at the center of the wire, which would result in a higher tensile strength at this section. Since the tensile strength is the average strength of the cross-section and the fatigue limit is dependent upon the strength of the surface of the wire, a lowering of the fatigue ratio would be expected.

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Conclusions

1. The tensile strength of cold-drawn wire is reduced by the machine-straightening operation and its ductility as measured by the elongation is increased.

2. The tensile strength of cold-drawn wire is materially affected by the rate of drawing. The greater the reduction in area per draft, the higher the tensile strength will be for the same total amount of wire drawing.

3. The 0.67 per cent carbon wire was affected to a greater extent by the rate of drawing than the 0.27 per cent carbon wire.

4. The reduction of area as determined by the tension test increased as the rate of drawing decreased on the 0.67 per cent carbon wire. The 0.27 per cent carbon wire was not affected in this respect by the rate of drawing.

5. The elongation of 10 in. was slightly improved by a low rate of drawing.

6. The rate of drawing had no consistent effect on the torsional properties of the material investigated.

7. The bending properties were considerably improved by reducing the rate of drawing. The bend test indicates that there is an optimum amount of wire drawing which will result in a maximum toughness for cold-drawn wire. The number of bends to cause fracture and the appearance of the fracture obtained in the bend test are believed to be a measure of the toughness of steel wire.

8. The rate of drawing affected the endurance limit in the same manner as the tensile strength. The endurance limit of the decarburized material was considerably lower than has been found for wire free from decarburization.

9. The endurance ratio increased slightly up to approximately 80 per cent reduction by wire drawing. The endurance ratio then decreased rapidly with further wire drawing.

10. The best combination of strength, ductility, toughness, and fatigue properties resulted from a total amount of wire drawing of between 75 and 80 per cent reduction.

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Acknowledgments

THE main part of this investigation was carried out at the Fritz Engineering Laboratory at Lehigh University, and the author wishes to express his appreciation to the Laboratory staff, which includes **Prof. Hale Sutherland**, Director, and **Dr. Bruce Johnston**, Assistant Director, for their valued assistance.

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THE author also wishes to express his sincere thanks to **C. W. Meyers** of the American Steel and Wire Co. for his generous cooperation and for the materials used in this investigation; to **L. H. Winkler** of the Bethlehem Steel Co. for his continued advice and assistance in making part of the torsion tests.

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THE author wishes to thank the John A. Roebling's Sons Co. for the permission to complete this investigation in their Development Engineering Laboratory, which is under **C. M. Jones**, Director of Engineering, and **Dartrey Lewis**, Chief Development Engineer.

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Discussion on Effect of Drawing Operations on Steel Wire

Mr. L. H. Winkler.[1]—There are one or two points brought out in this excellent paper which justify further discussion.

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FIRST, I want to congratulate Mr. Godfrey on his paper and especially on the unusual mechanical ingenuity displayed in developing a bend test procedure and the equipment described. Bend tests on wire heretofore have not been by any means satisfactory; quite possibly the mechanical equipment that was available at the time for making such bend tests was at fault. I think Mr. God-

frey has made a notable contribution to the testing of wire. His perfection and improvement of bend tests appear to have accomplished a great deal toward providing results that are more consistent than has generally been obtained in past work.

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UP until now many of us have regarded with skepticism bend test requirements and bend test results on wire. Judging from the amount of work which Mr. Godfrey has done to date and from the results reported in his paper, it would appear that we may begin to look upon bend tests with more assurance, particularly if they are carried out in a manner similar to that which he describes.

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IN practical experience we find that the rate of drawing does influence mechanical properties of wire. Those of us who have been associated with wire drawing have found that higher percentages of reduction per draft will usually result in higher tensile strength in the wire than would be the case if less reduction per draft (and, therefore, more drafts) were employed for the same given total reduction. At the same time, in actual practice we have also noted a corresponding reduction in the torsion values when the number of reductions have been reduced by virtue of greater reduction per draft. Upon reading Mr. Godfrey's paper I was surprised that this effect on the torsion values was not definitely borne out by results obtained in his research. It is possible that this may be accounted for by some detail in the preparatory heat treatment of the stock from which the wire was drawn; doubtless further work, which I expect he will pursue, will throw more light on this question.

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MR. GODFREY'S work shows that apparently for a given size and type of wire a total reduction of between 70 and 75 per cent results in the most desirable combination of physical characteristics. I should like to call attention to the fact that this may apply quite specifically only to the size ranges and the kind of wire covered by Mr. Godfrey's experimental work. The optimum percentage of reduction, I believe, will change with the size of the finished wire and also will depend upon the kind of wire that is to be produced. That is, although the best reduction may be between 70 and 75 per cent for these relatively large diameters of wire, it may be advisable to increase the percentage of total reduction in the manufacture of smaller sizes. For example, in the case of a similar grade of wire about 0.015 in. in diameter, a total amount of reduction of about 85 per cent may produce better results. Furthermore, the total amount of reduction is quite definitely dependent upon the details of the preparatory heat treatment, the number of drafts, the size of the wire, and especially upon the kind of wire that is to be produced. The point that I wish to make is that there is no one optimum percentage of reduction which will cover all sizes and kinds of wire currently produced in the full range of steel wire mill products, beginning with low carbons and ending with very high carbons; this is probably obvious and while I realize that Mr. Godfrey may be in agreement with this statement I think it is important to emphasize that point.

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Mr. J. H. Foote.[2]—There are two points brought out in this paper which might merit further study.

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IN the application of steel strand to overhead tower lines as ground wires, the problem of fatigue due to conductor vibration arises. Perhaps some further extension of these studies as to the treatment of wire during the drawing operation may give a higher fatigue limit by a fortunate combination of formulas for the carbon content and the percentages of drawing. I merely suggest that as something to be studied.

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A SECOND application which is of considerable interest to power and light companies relates to the method of fastening guy wires, which is of economic interest. For high-strength strand the use of bolted clamps is almost universal. Clamps are expensive, and very often the cost of clamps in a typical guy will equal or even exceed the cost of the strand. If we can eliminate the clamps we can save money, but to do that we must serve the strand at terminuses and at insulators in the guy. Experience has been unfortunate in serving hard wire. It is brittle, and very often individual wires of the strand will break during the serving operation. Certain experiments performed a number of years ago indicated that the processing of the wire, the rate of drawing and the percentage of reduction had a vital effect on the success or failure of the serving operation.

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Mr. Dartrey Lewis[3] (by letter).—I have been particularly interested in the three alternative methods of plotting the increase of tensile strength by wire drawing, as presented in Figs. 4, 5 and 6 of Mr. Godfrey's paper.

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FIGURE 4, which plots tensile strength against reduction of area, gives the impression that the strength increases gradually during the early wire drawing, and then very rapidly in the later stages of wire drawing.

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FIGURE 5, in which tensile strength is plotted against elongation, gives the impression that the strength increases very rapidly at first and then gradually tapers off.

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IN Fig. 6 the tensile strength is plotted against the logarithm of the strain. By this method of plotting, equal reductions of area per hole have equal horizontal spacing on the graph. It is believed that such a method of plotting is correct since, as every wire mill man knows, equal importance should be attached to, say, a 20 per cent reduction of area by wire drawing whether it occurs at the first, middle, or last hole. However, the formula for strain used by Mr. Godfrey is complicated and not very suitable for every-day use.

EQUAL spacing for equal reductions per hole can also be obtained by using a logarithmic scale on which is plotted the wire diameter. Mr. Godfrey's figures for the tensile strength of 0.67 per cent carbon steel have been replotted in the accompanying Fig. 1, using a logarithmic scale for wire diameters. At the bottom of the figure are shown the wire diameters for 10, 20, 30 and 40 per cent drafts. They illustrate that, with this type of plotting, the equal reductions of area have equal horizontal spacings. Also plotted are the wire diameters corresponding to 10, 20, 30, etc., up to 95 per cent total reduction of area by wire drawing based on the original diameter. The logarithmic distortion of this scale should be noted.

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THIS discussion is intended to be a plea for the graphical presentation of wire drawing data in which properties are plotted against the wire diameter represented on a logarithmic scale.

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IT will be observed from the accompanying Fig. 1 that the tensile strength increases more rapidly at the early and final stages of wire drawing than in the intermediate stages. However, up to 85 per cent total reduction of area by wire drawing no great error will result from assuming equal increments of tensile strength per hole (straight line graph). On such a basis, the following formula for tensile strength may be written:

$$S = K\ (\log D_1 - \log D_2)$$

where S = increase in tensile strength in pounds per square inch,
D_1 = initial diameter in inches,
D_2 = final diameter in inches, and
K = constant

APPLYING this formula to Mr. Godfrey's figures for a 0.67 per cent carbon steel, the increase in tensile strength due to wire drawing is given by the following formulae:

10 per cent Drafting.

$$S = 210\,000\ (\log D_1 - \log D_2)$$

20 per cent Drafting.

$$S = 234\,000\ (\log D_1 - \log D_2)$$

30 per cent Drafting.

$$S = 295\,000\ (\log D_1 - \log D_2)$$

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Mr. Howard J. Godfrey[4] (author's closure, by letter).—The author wishes to express his appreciation for the discussion of this paper. Mr. Winkler has emphasized the fact that there is no one optimum percentage of reduction which will produce the best physical properties for all kinds of steel wire. The author fully agrees with Mr. Winkler since the amount of wire drawing will be dependent on the desired physical properties for a given type of material and service.

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THE question of "size effect" in wire drawing is of extreme interest and might well be the subject of further research. There are certain fundamental changes that take place in steel as it is drawn into wire which are independent of the size of the wire. In the first instance wire drawing changes the original equiaxed structure to a tough fibrous structure. At the same time the plastic deformation work-hardens the steel and makes further deformation more difficult. Along with the fibering and work-hardening the original grains are fragmented and the crystallites formed tend to become oriented in one specific direction. This preferred orientation increases with the wire drawing and can be measured by means of X-rays. The results of X-ray diffraction studies on the 0.67 per cent carbon wire drawn 30 per cent per draft are shown in the accompanying Fig. 2. The examination was made on the material near the core of the specimens after first removing the outer layers with acid. The increase in the amount of preferred orientation represented by the concentration of the diffraction images into certain regions is very apparent as the amount of wire drawing increases. As a result of this preferred orientation the wire has definite directional properties.

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MR. FOOTE has discussed a practical problem in which two definite properties are desired in steel wire, that of high strength and toughness. There is no doubt that the method used in processing the wire will effect these physical properties. The bend test as described in this paper may be one means of determining the best type of wire for the service conditions discussed by Mr. Foote.

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MR. LEWIS has presented a method of plotting the physical properties which is very convenient, as it eliminates all computations for the true strain. The use of this method for denoting the amount of cold working would be of considerable aid in interpreting more logically the physical properties as affected by the amount of wire drawing.

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THE author wishes to acknowledge the work of **W. F. Boyer**, former student at Lehigh University, who carried out the X-ray studies under the direction of **Prof. H. V. Anderson** of the University.

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The Discussions at The Wire Association Meetings Will Be Published in Detail in the January, 1943 Issue of Wire and Wire Products.

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The Wage and Hour Law and The Walsh-Healey Act

A discussion of the Wage and Hour Law and the Walsh-Healey Act as furnished by the Wage and Hour Division of the U. S. Department of Labor. ✦ ✦ ✦

IT would be hard to exaggerate the importance of wire and wire products in our national economy. Try to imagine the modern world without wire! Our industrial and business structure simply could not exist and our domestic life would be sketchy, to say the least. This is equally true of the nation's war effort. Wire in some form or other is an integral part of almost every piece of fighting equipment, from high altitude bombers to submarines. The tremendous demands of modern warfare call for an unbelievable variety of wire products.

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THE U. S. Army Signal Corps alone makes direct use of 700 wire and wire products items that range from resistance wire below one thousandth of an inch in diameter to submarine cable. Moreover, the quantities needed are staggering. Like other key industries, the wire industry has been called on to do the "impossible" — and the successful response has been little short of miraculous.

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THIS activity has meant that many employers in the industry now find themselves covered by both the **Fair Labor Standards Act**, commonly known as the **Federal Wage and Hour Law**, and the **Walsh-Healey Public Contracts Act** which deals with labor standards in the performance of certain Government contracts.

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THOUGH inventive genius, sound scientific research and managerial skill underlie the achievements of American industry, we should not overlook the contribution that improved labor standards have made. They have brought a new element of stability that has reduced labor turnover and helped to foster better employer-employee relationships. This is reflected in the smooth functioning of some 1600 joint labor management committees embracing more than 3,000,000 workers. It is shown, too, in mounting production totals and in the high quality of our war materials.

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THE **Wage and Hour Law** applies to employees engaged in interstate commerce or in the production of goods for interstate commerce. Unless specifically exempted by the Act, all such employees must be paid not less than 30 cents an hour and not less than time and a half their regular rate of pay for all hours worked beyond 40 a week. There is, of course, no limitation on the number of hours employees may work, provided "overtime begins at 40."

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THE **Walsh-Healey Act**, passed June 30, 1936, applies generally to Government contracts for materials and supplies in excess of $10,000. This Act fixes standards of maximum hours, overtime compensation, child labor, and safety and health and prohibits the employment of convict labor in the fulfillment of contracts covered by the Act.

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THE minimum wages required under the **Walsh-Healey Act** are those which the Secretary of Labor has determined to be the prevailing minimum wage for specific industries in particular localities. So far such wage determinations have been made for some 56 industries with wage rates ranging from 30 to 70 cents an hour. In no case are these minima lower than those established under the **Fair Labor Standards Act.**

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SINCE May 27, 1940 a minimum wage determination for certain wire and wire products made by the Iron and Steel Industry has been in effect. The products covered by this wage determination, which applies to Government contracts above $10,000, are: wire, drawn; wire hoops, twisted or welded; wire nails and staples; twisted barbless wire, barbed wire, twisted wire fence stays and wire fencing (except chain-link fencing); wire rods; wire, spring; wire, telephone.

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THE minimum wage scales applying to these products under the **Walsh-Healey Act** are as follows:

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IN the states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, Texas, Virginia, and West Virginia (except the counties of Brooke, Hancock, Harrison, Marshall, Monongalia and Ohio), 45 cents an hour.

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IN the states of Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and the area in and about East St. Louis, Illinois, 58½ cents an hour.

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IN the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming, 60 cents an hour.

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IN the states of Connecticut, Delaware, District of Columbia, Illinois (except the area in and

around East St. Louis, Illinois), Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Wisconsin, and that portion of West Virginia consisting of the counties of Brooke, Hancock, Harrison, Marshall, Monongolia and Ohio, 62½ cents an hour.

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THIS wage determination permits the employment of apprentices at less than these minima if their employment conforms to the standards of the Federal Committee on Apprenticeship.

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BASIC straight-time hours of work under the **Walsh-Healey Act** are 8 in any one day or 40 in any one week. Overtime is permitted, of course, if time and one-half the basic rate is paid for all hours worked beyond these limits. For example, an employee whose total workweek consisted of four 10-hour days would be entitled to 8 hours at time and one-half under the **Walsh-Healey Act**, but under the **Wage and Hour Law**, which makes the workweek its standard, he would not be entitled to such overtime since his hours of work in that week did not exceed 40.

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WHERE an employee worked, let us say, five 10-hour days and one 5-hour day during a week, he would be entitled to 15 hours at time and one-half under either law.*

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IN general the **Walsh-Healey Act** prohibits the employment of boys under 16 and girls under 18 years of age. Until further notice, a special exemption permitting the employment of girls between the ages of 16 and 18 years in the fabrication of metal products (including non-ferrous metals) is effective. However, these girls may not work more than 8 hours in any one day, nor between the hours of 10 p. m. and 6 a. m.

***Employers who enter into certain collective bargaining agreements with their employees pursuant to provisions set forth in the Fair Labor Standards Act, may employ them up to 12 hours a day or 56 hours a week without the payment of time and a half for overtime.**

NOWADAYS, with the toll of industrial accidents mounting, the safety and health features of the **Walsh-Healey Act** take on new importance. This Act requires that goods supplied on a Government contract be manufactured or handled under safe and sanitary working conditions. In locations where State laws establish safety and health standards, observance of such regulations will be taken as prima facie evidence that employers are in compliance with these provisions of the **Walsh-Healey Act.**

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THE principal hazards which inspectors will look for are these: fire hazards; unguarded cutting machines and unguarded power transmission machinery; faulty ventilation and illumination; insanitary shop, washroom and other facilities. A pamphlet recently issued by the **Public Contracts Division** entitled "Basic Safety and Health Requirements," tells employers what safeguards are required.

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ADMITTEDLY these safety provisions will offer nothing new to many concerns, especially those that have engaged safety engineers and are carrying out advanced safety programs. But the hard fact is that a shocking number of employers still neglect even the most rudimentary precautions. According to estimates of the U. S. Bureau of Labor Statistics, in 1941 industrial accidents caused 19,200 deaths, 100,600 permanent impairments and 2,060,000 temporary disabilities. The time lost exceeded 42,000,000 man-days.

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NOT all of these accidents can be prevented, of course, but the huge total can be curtailed and so provide our vital industrial front with additional much-needed manpower.

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THE agencies charged with enforcing the **Wage-Hour** and **Walsh-Healey Laws** cooperated closely in the past. To further facilitate the work of administration and enforcement, the two agencies have been merged under an order of the Secretary of Labor. Now called the **Wage and Hour and Public Contracts Divisions** of the U. S. Department of Labor, the combined Divisions are directed by **L. Metcalfe Walling,** the present head of the Wage and Hour Division, who was also the first and only Administrator of the Public Contracts Division.

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EXCEPT in the case of certain Defense Production Associations, the **Walsh-Healey Act** requires that every contractor be a manufacturer of or a regular dealer in the materials or supplies to be furnished under the Government contract. Where a dealer has a manufacturer deliver goods directly to the Federal Government, he will be considered an agent of the manufacturer and the latter's employees will be subject to the provisions of the **Walsh-Healey Act** while they are engaged in any operation necessary to fulfillment of a Government contract above $10,000.

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IN cases where a manufacturer buys materials or parts to be used in producing the commodity called for by his contract and it is a regular practice in his industry to purchase such supplies and not to manufacture them, the work performed by the vendor is not subject to the Act. For example, a concern buying ingots, bars, slabs, and the like, for further processing in fulfillment of a Government contract would not be required to see to it that these materials were produced in accordance with the **Walsh-Healey Act.**

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THIS does not mean, however, that a contractor may avoid compliance with the Act merely by shifting the work to a substitute manufacturer. In cases where the contractor turns over to another work which he would normally perform in his own plant, the contractor is liable for any violations of the **Walsh-Healey Act** which occur while the sub-contractor is preparing materials that are used to fulfill the Government contract.

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NOTHING in the **Walsh-Healey Act** prevents any person from meeting his Government contract

out of stock on hand or manufactured before the contract was let. Thus it does not apply retroactively. The Act does apply, however, to employees who do further work on such material, either in processing or packing and shipping the goods **after** a contract is awarded.

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IT may happen that an employee does both commercial and Government work in the same payroll or workweek. In such cases he is entitled to at least the basic minimum wage for all hours worked that week **unless** accurate records segregate his work on the contract from his other work. He is also entitled to time and one-half for all overtime worked in that week. Thus the overtime provisions of the **Walsh-Healey Act** always apply to an employee for the entire week in which he performs any work on a Government contract above $10,000, and the minimum wage provisions also apply for the whole week unless accurate records segregate his Government and non-Government work.

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IF a concern operates more than one establishment, each plant or unit will be considered separately so far as coverage under the **Walsh-Healey Act** is concerned. The Act is applicable to all departments and employees of an integrated establishment engaged in work necessary to the performance of a Government contract.

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CONTRACTS which exceed $10,000 come within the **Walsh-Healey Act** irrespective of whether the material is delivered in installments or in one lot. Where a person bids on several items with an aggregate value above $10,000 but receives an award on only a few items totaling less than $10,000 his contract will not be subject to the Act.

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BOTH the **Wage and Hour Law** and the **Walsh-Healey Act** contain certain exemptions and exceptions — provisions designed to give these laws added flexibility. Section 13(a)(1) of the **Fair Labor Standards Act** exempts from the minimum wage and overtime provisions any person employed in an "executive, administrative, professional or local retailing capacity, or in the capacity of outside salesman," as these terms are defined and delimited in Title 29, Chapter V, Code of Federal Regulations, Part 541.*

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WITHOUT discussing all of the requirements for exemption in these categories, it may be said that executive employees must be paid a salary of at least $30 a week to qualify for exemption; for administrative and professional employees the salary test is $200 monthly, except in the case of lawyers and physicians for whom there is no salary requirement. It should be emphasized that **in addition** to the salary requirements, the duties of these employees must coincide fully with the official definition given in the regulations.

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IN general, the **Walsh-Healey Act** does not apply to office and supervisory employees, to custodial employees or to certain maintenance workers. A foreman who does no manual work and has no direct physical contact with the goods furnished the Government will be exempt even if he occasionally lends a hand in the course of his purely supervisory duties.

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THIS Act does apply to employees engaged in occupations connected with the manufacture, fabrication. testing, handling or shipping of goods furnished the Government in amounts above $10,000. Thus it will apply to laboratory technicians, draftsmen, (except supervisory draftsmen), tool and die makers and other employees whose work is closely associated with the productive processes involved in the manufacture of products required by the Government.

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THE terms "custodial" and "maintenance" refer to employees whose duties are directed to the upkeep of the plant **and** who do no work on the commodities furnished the Government. Firemen engaged in producing heat and power for plant operation, telephone operators, janitors and watchmen usually would fall into this exempt category.

✦ ✦ ✦

BOTH Acts require covered employers to keep certain time and payroll records which must include the following information: Employee's name, address, occupation (and age in the case of minors); time of day and day of the week on which employee's workweek begins; regular hourly rate of pay; hours worked each workday and total hours worked each workweek; total deductions from or additions to employee's pay; total daily or weekly straight-time earnings; total weekly overtime excess earnings, that is, the amount paid solely as overtime, above all straight-time earnings; total wages paid each pay period and the pay period covered by each payment.

✦ ✦ ✦

THOUGH education and voluntary compliance have featured the administration of these two laws, both Acts have "teeth" in them. Penalty provisions of the **Wage and Hour Law** include for wilful violators a fine up to $10,000, and, in the case of a second offense, imprisonment up to six months, a fine or both. Disabilities that may result from failure to comply with the **Walsh-Healey Act** include cancellation of the contract, and, where flagrant violation is found, employers can be blacklisted from Federal contracts for a period of three years.

✦ ✦ ✦

"ENFORCEMENT policy has stressed the importance of securing compliance through voluntary action," Administrator Walling said recently, "and that policy will be continued wherever employers are cooperative. Nowadays all of us, management, labor and Government are pretty well agreed that improved labor standards point the way to improved production. Industrial progress is a matter of men and machines and

(*Please turn to Page 737*)

***These regulations and other informative publications concerning the Walsh-Healey Act for Fair Labor Standards Act are available without cost at all offices of the Wage and Hour and Public Contracts Divisions, including the National Office, Desk MSS, 165 West 46th Street, New York, N. Y.**

Coating Nylon, Formvar Etc. On Wire

For the new operation of coating wire with high viscosity synthetic coatings it has been necessary to design suitable wiping dies and holders for these dies. A description of a recent development is given herewith. ✦ ✦ ✦

THE introduction of high viscosity synthetic coatings, such as solutions of Nylon, Formvar etc., for magnet wire is fast resulting in a major change in the art of enameling wire.

✦ ✦ ✦

THE solutions of Nylon or Formvar, being relatively high in viscosity and low in solids are most economically applied to wire by means of wiping dies. For this coating operation it has been necessary to design suitable wiping dies and holders for these dies. In most cases this equipment has proved expensive because of the precision machine work necessary to make dies, and die holders that will line them up on the wire to be coated. In spite of the precautions taken the coatings often are not concentric on the wire. This condition may be caused by the coating die itself, the use of a die holder that does not permit the coating dies to follow all the movements of the wire being coated or incorrect application of the heat necessary to set up the coating.

✦ ✦ ✦

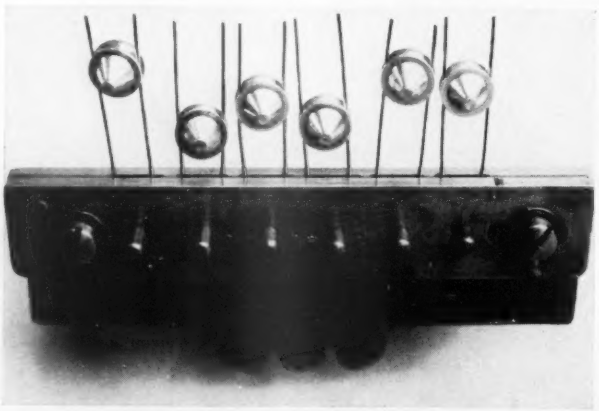
CONSIDERABLE effort has already been expended in producing wiping dies for this job and several usable types are available.

✦ ✦ ✦

THE Wire Enamel Laboratories of E. I. du Pont de Nemours & Company, Inc. have developed a simple cone shaped die and die holder, shown in the accompanying photograph, the principles of which can easily be adapted for the cone die made solid or split. the split dies commonly used for applying Formvar, or most any of the coating dies now in use by the Magnet Wire Industry.

✦ ✦ ✦

THE duPont Die Holder offers definite improvements over existing equipment in several respects. The coating dies are securely anchored so that they cannot pull loose and be carried by the wire into the baking oven, and at the same time the coating dies are permitted to move freely in all directions in one plane at right angles to the axis of the wire being coated. This freedom of movement, absolutely necessary for accurate trouble free coating, is accomplished by the die holder design which permits the coating dies themselves to move freely on the fingers that anchor them and the fingers to swing in an arc, so that any movement of the wire being coated is followed instantly and easily by the coating die. This results in a remarkable improvement in depositing the coating equally and evenly around the wire. Films varying less than one thousandth of an inch can be applied to wire in a six coat setup using the duPont die holder in combination with the commonly used coating dies.



Holder for dies used in applying nylon, formvar and other coatings in regular use at the duPont Fabrics and Finishes Departments wire enamel laboratories in Chicago since its development by F. J. Emig, chemist.

✦ ✦ ✦

FURTHER, by removing a peg any of the hairpin shaped fingers may readily be taken out for service, cleaning or replacement, or the entire apparatus may be taken apart if desired. Adjustments are simple and can be made by any wire operator. The photograph shows a six coat setup for one wire using duPont cone shaped dies. By lengthening the holder a whole machine can be taken care of by one outfit.

✦ ✦ ✦

THE apparatus can be made by most any plant machine shop since no precision machine work is necessary. The hairpin shaped fingers should be stiff enough to hold their shape and anchor the die. They must always swing freely but hold the die so it operates in a plane at right angles to the axis of the wire. This is important, since no matter how perfect a die is, it can't coat evenly if it is held at any angle that makes its wiping surface in effect an elipse instead of a perfect circle.

✦ ✦ ✦

SOMETIMES non-concentric coatings on wire are due not to the wiping die or die holder employed but to uneven heat distribution in the oven used to bake the enamel film which causes the wet coating to creep (*Please turn to page 730*)

Standardization of Diamond Drawing Die Sizes

By Paul Grodzinski,

Technical Consultant, Industrial Diamond Review,
London, England

I READ with interest the various comments on the standardization on Diamond Drawing Die Sizes on Page 402 of the August 1942 issue of Wire and Wire Products, and from this it can be concluded, that this problem seems not to be a favoured subject under Die Manufacturers. Any size recommended has to be a compromise between the following three requirements.

1. **Shape of the stone, whether ball-shape, flat or octahedron shape.**
2. **Minimum price, i.e. smallest weight to ensure still a stone to resist the stress.**
3. **Optimum diameter to make enlarging of the stone to a larger size possible.**

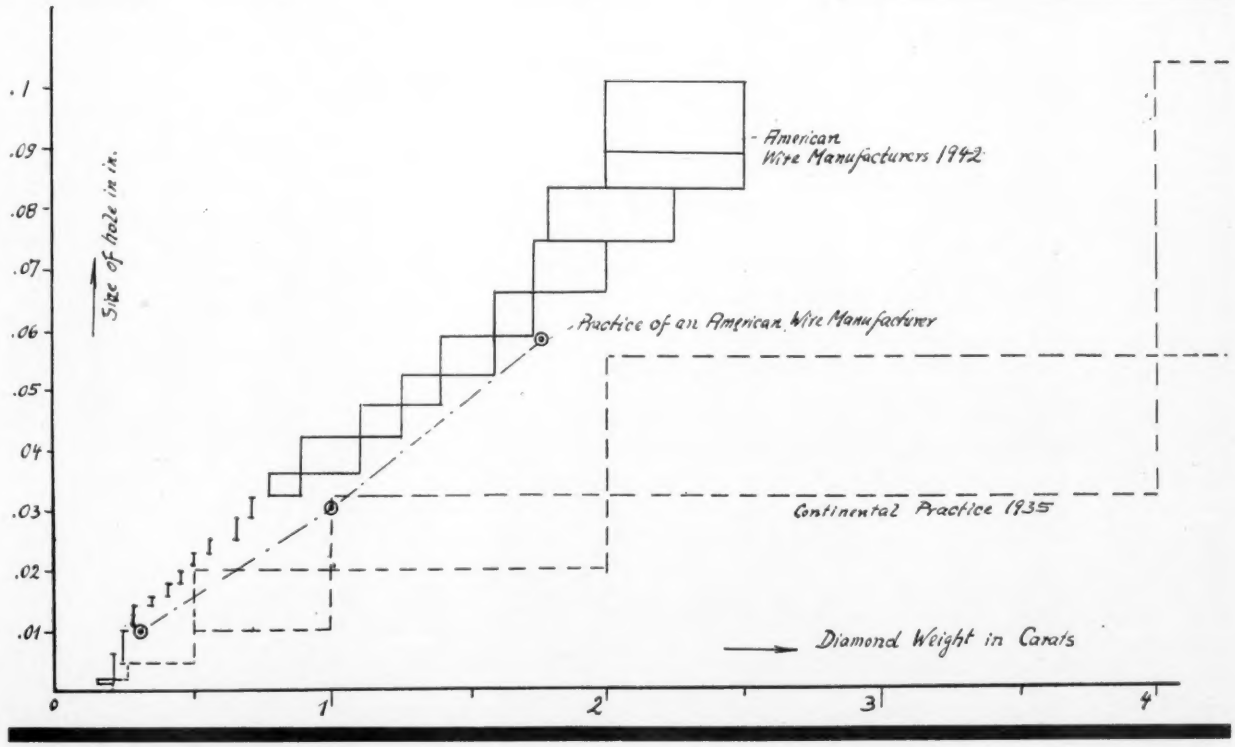
✦ ✦ ✦

REQUIREMENTS 2 and 3 are somewhat contradictory and the writer always is in favor of somewhat larger stones which give additional security. In my text book "Diamant-Werkzeuge" 1936 from which an English translation is now in the course of preparation in the U. S. A. I recommended the die size according to table 1, and the data in this table together with the recommendations in Wire and Wire Products, August 1942, p. 402. From this it is obvious that the U. S. A. values are very closely stepped and owing to this seem to defy partially the principle of a sound standardization. Therefore in some range somewhat more coarse steps may be recommended.

A BRITISH diamond die maker to whom I showed the table comments as follows: "I find the diameter sizes up to .040 in. diameter given for various weights to be exactly in accordance with my own view but have not tested beyond that size."

Continental Recommendations for Diamond Dies for Copper Drawing

Diameter inches	Size in carats
0.002 - 0.004	0.20 - 0.25
0.004 - 0.01	0.25 - 0.50
0.01 - 0.02	0.50 - 1.00
0.02 - 0.032	1.00 - 2.00
0.032 - 0.055	2.00 - 4.00
0.055 - 0.1	4.00 - 8.00



✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

All Copper Going Into War Effort

EVERY pound of copper available currently is going into direct military orders, shipments to our Allies, or into the most essential industrial uses bearing preference ratings of A-1-a or higher, H. O. King, chief of the copper branch, said recently.

✦ ✦ ✦

CURRENT copper supply, in excess of 200,000 tons per month, is the largest in the country's history. Domestic mine and smelter production is larger than ever before, imports exceed any previous year, and scrap collections are at a new high. Approximately 31 per cent of this year's total copper supply will come from old and reprocessed mill scrap.

✦ ✦ ✦

THE extreme tightness of the copper situation is demonstrated by the fact that copper currently used for domestic electric systems, communications, industrial motors and fittings, chemical plants, and all of the thousands of industrial and essential civilian purposes which must be met is much less than one-fifth of our total supply. Copper scarcity is further reflected by the recent announcement of the copper branch that even brass and wire mills and foundries would be allotted no copper of any kind, including scrap, except on preference ratings of A-1-a and higher.

✦ ✦ ✦

THE following figures show how the copper industry has responded to war needs, beginning with exports for military purposes to Europe in 1939:

TOTAL UNITED STATES COPPER SUPPLY BY YEARS

Including domestic production, scrap and imports (in short tons)

1939	1,525,500
1940	1,913,800
1941	2,467,100
1942	[1]2,571,700

[1] Estimate.

✦ ✦ ✦

THE United States always has been the largest producer, and the largest consumer, of copper. Despite our overwhelming superiority in copper production, we have leaned heavily on imports.

✦ ✦ ✦

THE last year for which complete figures are available, 1938, shows how we stood with respect to the rest of the world:

SMELTER PRODUCTION

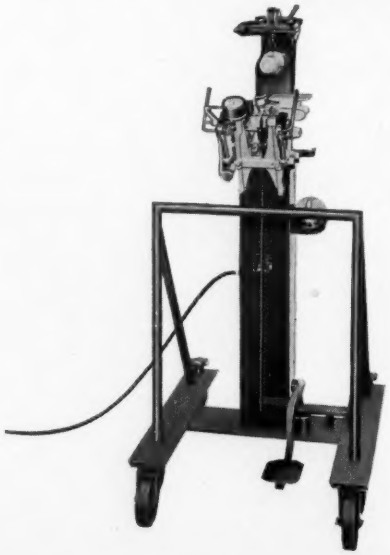
	Metric tons
United States	570,773
Canada	215,732
Chile	337,508
Germany	70,000
Russia	114,552
Yugoslavia	41,993
Japan	102,000
Africa	353,861
Australia	17,372
Other	117,209
Total	2,041,000

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO, ILL.

Telephone, State 7468

With United States copper supply this year greater than the whole world in 1938, it is clear that, badly as we need copper, we still are far out in front of the Axis powers.

✦ ✦ ✦

STEEL is being substituted for brass in some ammunition today in an attempt to take some of the pressure off copper.

✦ ✦ ✦

War Increases Demand

THERE is just one reason why we must have nearly five times as much copper this year as our mines produced in 1938. That reason can be found by examining the material being used to fight this war.

✦ ✦ ✦

A MEDIUM tank takes almost a half ton of copper; one type of scout car, 150 pounds. One type of fighter plane uses over 800 pounds, and the big Flying Fortress uses over a ton and a half of copper. A battleship uses two million pounds of copper. All these are front-line fighting tools. We must have them in great quantities, and they cannot be built without copper. That is where our copper is going.

✦ ✦ ✦

AMMUNITION is one of the largest users of copper. The shell casing on every shell from a .30-caliber bullet to a big 105 mm. shell is made of brass—30 per cent zinc and 70 per cent copper. Modern warfare burns up ammunition at a rate never before dreamed of.

✦ ✦ ✦

THE copper situation can be summed up with the statement that it is quite possible that copper supply will determine the amount of munitions and war material that we can produce in some of the major categories.

✦ ✦ ✦

OUR attack on the critical copper situation has several spearheads. First of all, we have increased production tremendously —more than doubled it since 1938, in fact. Then, we are importing as much as we can. Two other war measures are the severe restriction of nonessential uses, and the

(*Please turn to Page 720*)

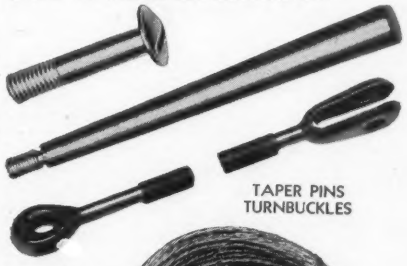
Also at the Pilot's Command....

KEYSTONE *Wire*

At the command of the United Nations' pilot are not only his engines, guns, bombs and crew–but also literally thousands of parts in his plane made from wire. In fact he could not get aloft without such construction items as control cables, guy wires, stays, and bolts. On the sea and with the land forces, too, as well as in the air . . . wire is definitely at war, "drafted for the duration". Keystone, side by side with the Country's other wire makers, gladly holds itself at the command of the main job at hand.

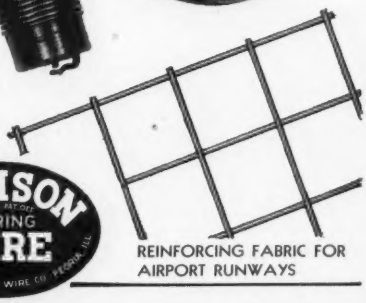
KEYSTONE STEEL & WIRE CO.
PEORIA, ILLINOIS

More than 100,000 parts are required to build a bomber. A large percentage are made directly from wire, only a few of which are illustrated.



TAPER PINS
TURNBUCKLES

CONTROL CABLE AND GUY WIRES



REINFORCING FABRIC FOR AIRPORT RUNWAYS

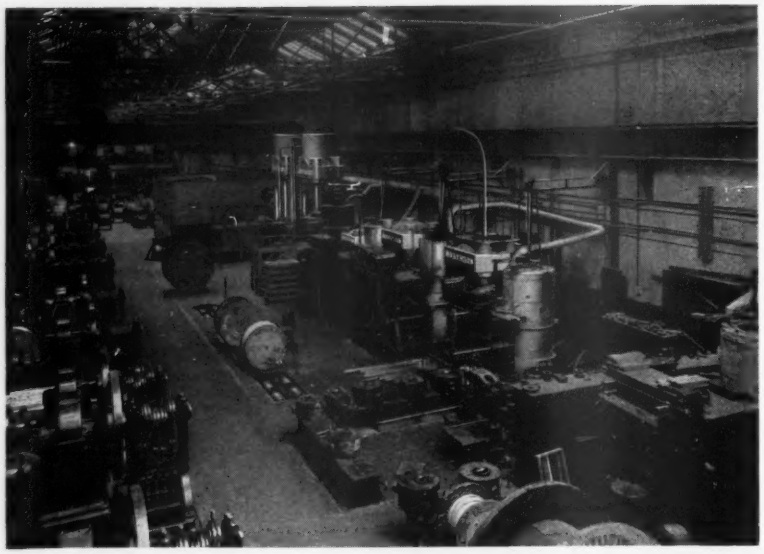
Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE

at

NORTHERN ELECTRIC

MONTREAL, CANADA



Here, too, Robertson Equipment is predominant!

Illustration shows the Lead Cable Department and some of the ROBERTSON Lead Cable Encasing Presses.

This installation includes: Two 2500-ton presses, four 2100-ton presses and two 1000-ton presses, with their respective lead melting pots — all ROBERTSON-built.

Choose ROBERTSON Equipment and you can't go wrong. Not only Northern Electric — whose installation we illustrate above, but Roebling, Goodyear, General Cable, General Electric, U. S. Rubber, Anaconda, Paranite, Goodrich, Swan, Boston and practically every other leading concern in the Industry is a user of ROBERTSON Equipment.

Operating and performance data gladly mailed on request.

John Robertson Co. Inc.

125-137 WATER STREET, BROOKLYN, N. Y.

Designers and Builders of

All types of lead encasing machinery for rubber hose and electrical cable manufacturers, including Extrusion Presses, Hydraulic Pumps, Melting Furnaces and Pots, Dies and Cores, Hydro-pneumatic Accumulators and Lead Sheath Stripping Machines.

Government Wire Production Information

(*Continued from Page 719*)

substitution of other materials for copper wherever possible.

✦ ✦ ✦

From Overseas

WE will receive larger amounts of copper than ever from some of our Good Neighbors to the south, principally Chile, Peru and Mexico, and from Africa and Canada. Our copper problem is the problem of all the United Nations. We must expect that some of our copper will have to be sent to others, and it is possible that some of the copper we now get from Canada will, in a few months, have to be sent to Great Britain.

✦ ✦ ✦

Nonmilitary Uses

SOME nonmilitary uses of copper are essential and must be continued. Light and power for industry and housing must be provided, communications must be maintained, and a few other uses without which our society could not operate are being taken care of in a limited way.

✦ ✦ ✦

ASIDE from these, you could not legally buy a pound of copper with an equal weight of gold! Restrictions on copper use for nonessentials are being enforced by WPB General Conservative Order M-9-c and other orders so that no copper may be used now without specific authorization of WPB.

✦ ✦ ✦

IN industry, many ways are being found to substitute other materials for critical copper. Silver is being used in some electrical equipment, revisions of brass specifications are being made even in Army and Navy munitions to conserve copper, and other switches to less critical metals are being made wherever possible. Simplification of pipe fittings by WPB saves enough copper in a year to put the rotating bands on a million 14-inch shells.

✦ ✦ ✦

Our Last Resort

A VAST mine of copper exists in this country, the obtaining of which can be speeded by every American. That mine is unused

scrap and waste copper. By collecting old scrap and channeling it back into production, we hope to make available this year an additional 300,000 to 400,000 tons of copper.

✦ ✦ ✦

ONE part of this program is the activity of Copper Recovery Corporation, which acts as an agent of Metals Reserve Co. buying up stocks of unused copper and brass, and even fabricated products made of these metals, which are not being used in essential war work.

✦ ✦ ✦

End-Use Information Required

ALTHOUGH the Allocation Classification System was abolished recently, WPB's Copper Branch will continue to require end-use information from brass mills, copper wire mills and copper foundries, before making allocations. To avoid delays in delivery, all persons ordering copper and copper-base alloy products from mills and foundries are warned that they must provide as much end-use information as possible, in order that the suppliers may include it in their applications for WPB authority to fill particular orders.

✦ ✦ ✦

THE Iron and Steel Branch pointed out that the end-use information requirements of General Preference Order M-17 and orders in the M-21 series remain mandatory and are not affected by the revocation of Regulation No. 10.

✦ ✦ ✦

Extend Iron and Steel Limitations In Household Utensils

EXISTING limitations on the use of iron and steel in certain kitchen and household utensils have been extended for the month of October by the War Production Board.

✦ ✦ ✦

ORDER L-30, as amended, provides that the 70 per cent limitation on use of iron and steel in Group 1 products and the 50 per cent limitation for Group 2 products continue in effect. The action was taken pending issuance of permanent supplementary orders.

✦ ✦ ✦

Barbed Wire Output Limited to One Type By Revised Order L-211

TO aid the production of barbed wire, wire fencing, and poultry netting needed to protect farm properties, crops and livestock, the War Production Board has prohibited the manufacture of non-essential types and styles of such wire products.

✦ ✦ ✦

A NEW schedule, No. 3, to Limitation Order L-211 will permit the manufacture of only one type of barbed wire, compared with eight styles usually obtainable, and reduce from more than 100 to a very few the permitted types of fencing, netting and flooring.

✦ ✦ ✦

PREVIOUS schedules to L-211 (National Emergency Specifi-

(*Please turn to Page 722*)

ANNOUNCING A SPECIAL ISSUE FOR JANUARY, 1943

SPECIAL BECAUSE — It will contain the following:
The discussions on technical papers at the annual meeting of the WIRE ASSOCIATION.

✦ ✦ ✦

The Directors of the WIRE ASSOCIATION have approved this plan to provide these discussions to all members without extra expenditure.

✦ ✦ ✦

The Mordica Memorial Lecture for 1942, by Louis H. Winkler, Metallurgical Engineer, Bethlehem Steel Company, Bethlehem, Pa., on the subject "STEEL AND WIRE"

✦ ✦ ✦

"Whoosis for President" by Kenneth B. Lewis, Consulting Wire Mill Engineer, Worcester, Mass.

✦ ✦ ✦

— TO OUR ADVERTISERS —

The advertising value of this special arrangement to be followed in the January issue of WIRE and WIRE PRODUCTS is obvious.

✦ ✦ ✦

Revised rate card will apply to this issue — Closing date, December 21st, 1942.

✦ ✦ ✦

RESERVE YOUR SPACE AT ONCE

WIRE & WIRE PRODUCTS

300 MAIN STREET PHONE STAMFORD 3-0482 STAMFORD, CONN.

Government Wire Production Information

(*Continued from Page 721*)

cations for Steel Products) required the simplification of structural steel shapes and railway car wheels.

✦ ✦ ✦

THE new schedule is expected to result in a direct saving of steel by enabling a greater amount of wire to be made per ton of metal. During the last five years, an average of 496,000 tons of steel was used annually for the production of barbed wire, wire fencing, and netting.

THE amount of steel now available for such purposes is sharply lower. The simplification program announced today is designed to make the available amount go as far as possible. Iron and Steel Branch officials indicated that the new schedule is tantamount to a doubling of the tonnage of steel available for essential wire uses.

✦ ✦ ✦

IN addition, the schedule will result in the corollary advantages of most simplification programs—reduction in inventories, an increase of the operating efficiency of machines, and conservation of machine-time and labor.

✦ ✦ ✦

Bessemer Process Steel Urged Upon Consumers

STEEL consumers are urged to use, wherever possible, steel made by the Bessemer process or re-rolled from old rails, instead of steel made by the open-hearth process.

✦ ✦ ✦

H. G. BATCHELLER, Chief of the Iron and Steel Branch, pointed out that in recent years, steel consumers have become accustomed to buying open-hearth steel because of the close controls obtainable over the properties of the steel.

✦ ✦ ✦

"THIS practice is being continued today," Mr. Batcheller said, "despite the fact that Bessemer steel or rail steel would in many cases serve equally well.

✦ ✦ ✦

"THE supply of both Bessemer steel and re-rolled rail steel is not being used to the best possible advantage. Increased use of this supply would relieve the pressure on open-hearth steel and be a substantial contribution to the war effort."

✦ ✦ ✦

BESSEMER steel is available in many products, including bars, plates, shapes, sheets, strip, pipe, wire products and track accessories. Rail steel bars, which are rolled from old railroad rails, also are adaptable for purposes for which open-hearth steel now is being used. Such uses include re-inforcement of concrete, and agricultural implements.

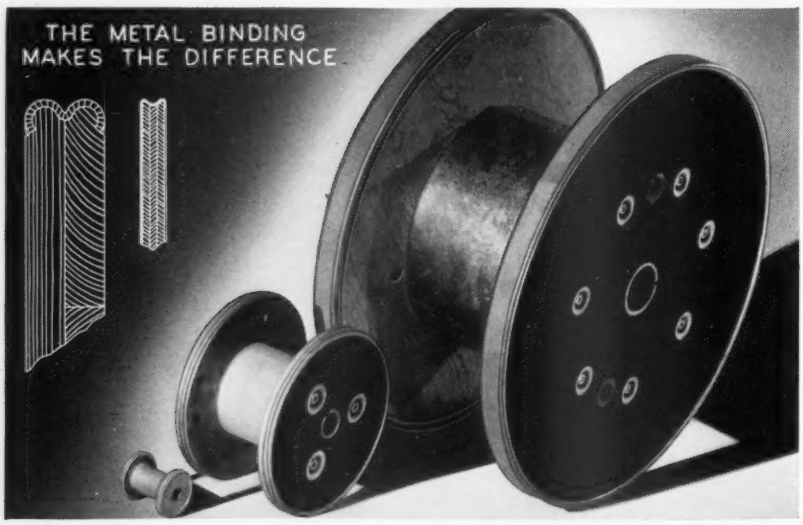
✦ ✦ ✦

Manufacture of Safety Razors, Blades, for Use By Civilians Halted

RAZORS and razor blades were put under tighter production and distribution restrictions recently with issuance of Order L-72, as amended, by the Director General for Operations.

✦ ✦ ✦

THE amended order makes these provisions: Safety razors can be produced only for the military forces, for export and for Lend-Lease purposes. None will be manufactured for civilian use.



Serve Yourself and Your Customers **BETTER**

With HUBBARD Metal Bound Shipping Spools and Reels

With wood for lightness combined by a patented process with steel for strength, Hubbard spools and reels have the stamina to withstand the roughest handling. Where breaking, warping, and splintering might occur, there the die formed steel protects the wood.

Such construction means long run economy. You'll be buying spools and reels less often. Both you and your customers will be guarded against needless breakage losses. You'll find that employees like to work with Hubbard spools and reels, since there are no jagged rough edges to cut hands and tear clothing.

Serve yourself and your customers better by switching to these true running, stronger carriers for all types of wire. They are modern in design and moderate in price. Write for full details.

HUBBARD SPOOL COMPANY

1624 CARROLL AVENUE | CHICAGO, ILLINOIS

Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.

RAZOR blades are allocated for the armed forces, export and Lend-Lease and for civilians. Production of blades next year will be 12% greater than 1940 output and 20% less than 1941 output, (1941 was a record-breaking year, with over three billion blades produced.

✦ ✦ ✦

AS as result of all these restrictions, upward of 800 tons of steel will be saved, some of which is of the high-carbon variety used for essential purposes in the production program.

✦ ✦ ✦

Survey of Brass and Wire Mill Products Warehouses

THE Compliance Division of the War Production Board announced recently that it was conducting a survey of the operations of warehouses which stock brass and wire mill products. Particular attention is being paid to their degree of compliance with the order restricting sale of copper and copper base alloys to customers whose purchase orders are rated A-1-k, or better. Inventories also are being checked against the requirements of the suppliers' inventory limitation order.

✦ ✦ ✦

THE survey is conducted by means of report forms mailed from Washington, and with the assistance of investigators of the Wage and Hour Division of the Department of Labor, who will make the necessary field examinations.

✦ ✦ ✦

Firms Operating Under PRP May Now Extend AAA Ratings

FIRMS operating under the Production Requirements Plan now are permitted to extend AAA ratings, which they receive on customers' purchase orders, by the terms of Amendment No. 1 to Priorities Regulation No. 11, as amended.

✦ ✦ ✦

THE amendment, effective November 2, lays down the conditions under which a PRP unit may extend an AAA rating. These conditions are:

1. **An AAA rating may be extended when necessary to obtain material which the PRP unit will deliver, or which it will physically incorporate into material to be delivered, on the AAA rating;**

For Information Regarding The Wire Association Address

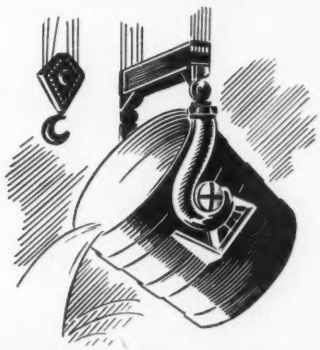
Richard E. Brown, Secretary
300 Main St. Stamford, Conn.

2. **The AAA rating may be extended only to obtain the quantities of materials required to fill AAA-rated orders;**
3. **The rating may not be extended to obtain any material which a PRP unit has on hand, or to replace inventory;**
4. **The quantity of any material obtained with assistance of the AAA rating must, so far as possible, be deducted from the quantity authorized on the unit's PRP certificate.**

✦ ✦ ✦

IN case it is necessary to extend the rating to materials other than those authorized on a PRP certificate, or in larger quantities, a PD-25F form must be filed within three days after the extension, reporting the additional quantities or materials to which the AAA rating was extended.

ACP Products and Processes CONTRIBUTE in Record Steel Production



With steel mills throughout the land straining for peak production, the savings in steel and acid made possible by RODINE are more important than ever before. Also of great importance now is the safety factor provided by RODINE. It prevents overpickling and scrapping of finished steel under the pressure of the rush to produce.

Other ACP Products and processes are lending a hand, too. CUPRODINE is used to produce a dense, bright copper coating on steel by a simple immersion (non-electrolytic) process in wire mills and on steel shell cases before drawing. RIDOLINE and the ACP Alkali Cleaning System cleans strip and plates in a continuous operation to speed-up production and provide better finishes.

•

These Products and Processes are, however, only typical of the many contributions ACP can make to your production goal.

Others include: DEOXIDINE to prepare steel, aluminum and dural properly for painting; FLOSOL the exceptional soldering flux; KEMICK for painting metals subject to high temperatures; LITHOFORM to coat galvanized iron to hold paint.

Let the quarter-century of experience that has made ACP Products and Processes known the world over help you solve the problems of today's production . . . no matter what your metal treating and finishing needs.

AMERICAN CHEMICAL PAINT CO.
MAIN OFFICE AND WORKS
AMBLER · · · PENNA.

ACP
CHEMICALS ACP PROCESSES

DETROIT, MICH., 6335 Palmer Ave., E.
CANADIAN BRANCH
WALKERVILLE · · · ONT

Outstanding Personalities of the Wire Industry

T. G. Bergin, Wire Heat Treating Division, A. F. Holden Company

IT was recently announced that **T. G. Bergin** formerly with American Steel and Wire Co. at

T. G. BERGIN

Worcester in the Open Hearth, Rolling Mill, Wire Mill and Metallurgical departments and for the past four years at the New Haven Plant as Work Metallurgist,—specializing on high carbon heat treating and wire drawing is now in charge of the Wire Heat Treating Division of the A. F. Holden Co.

✦ ✦ ✦

Fred C. Tanner, General Manager Federal Products Corporation

FRED C. TANNER, Vice President and formerly Manager of Engineering Sales, has been advanced to the position of General Manager of Federal Products Corporation.

✦ ✦ ✦

MR. TANNER was at one time Development Engineer on new inspection, quality control and production at Western Electric Company in Chicago and later Chief Inspector of Radio and General Manufacturing with the General Electric Company, Bridgeport, Connecticut.

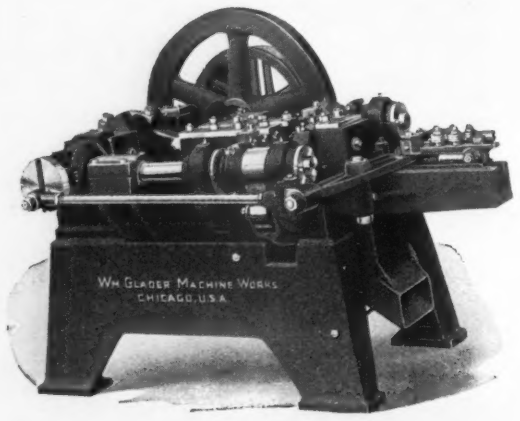
Anson B. Albree, Purchasing Agent, A. F. Holden Company

ANSON B. ALBREE, formerly assistant metallurgist at Wetherell Bros. Co., Cambridge,

ANSON B. ALBREE

Mass. and more recently with the Bridgeport Grinding Machine Company, West Haven, Conn. as

HIGH SPEED WIRE NAIL MACHINE



WM. GLADER MACHINE WORKS

210 N. Racine Ave. Chicago, Illinois

Glader Machines on large head, single-blow roofing nails can be seen in operation at any of the independent wire mills in the United States.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	⅜"	12"	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

purchasing agent and metallurgist —is now associated with the A. F. Holden Company at their West Haven plant assigned to research and development of new products. Mr. Albree is Chairman, New Haven Chapter American Society for Metals War Products Advisory Committee and a member of the Executive Committee for the past three years.

✦ ✦ ✦

H. A. Stringfellow

IT is with deep regret that we note the death of **Mr. H. A. Stringfellow,** Principal Industrial Specialist of the War Production Board of Boston, Mass., and a long-time member of the Wire Association.

✦ ✦ ✦

MR. STRINGFELLOW graduated as a civil engineer in 1910 from Rensselaer Polytechnic Institute becoming Head Instructor of Civil Engineering at Mechanics Institute in Rochester, New York from 1913 to 1915. He then engaged in civil engineering work in the United States, Japan, China, the Philippine Islands and South America until 1926 and then

H. A. STRINGFELLOW

until 1930 engaged in developing the compacting process for rounding and compacting the cables of the George Washington Bridge for the Southwark Foundry & Machine Company. From 1930 to 1934 he was in charge of Special Machinery Division of the Elevator Supplies Company.

✦ ✦ ✦

IN 1935 Mr. Stringfellow started investigation and research work on back pull drawing from which the present Reactive Wire Drawing method has developed. And in 1941 he became principal Industrial Specialist of the War Production Board which position he held at the time of his death.

✦ ✦ ✦

Alexander C. Brown, Deputy Chief, Iron and Steel Branch, War Production Board

APPOINTMENT of **Alexander C. Brown** of Cleveland, Ohio, as Deputy Chief of the Iron and Steel Branch was announced recently by **Hiland G. Batcheller,** Chief of the Branch.

✦ ✦ ✦

MR. BROWN has been First Vice President of the Cleve-

(*Please turn to Page 731*)

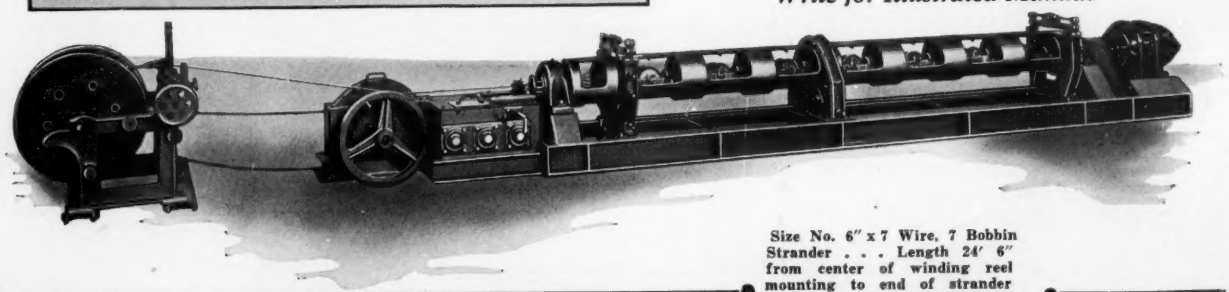
ROBINSON TUBE-TYPE **WIRE STRANDERS**

Dynamically Balanced! No Vibration!

IN this new Robinson Tube-Type Wire Strander are embodied the suggestions of engineers and operators of numerous wire cable plants throughout the country. As a result of careful study and field contact, this machine now meets the most exacting requirements of the industry. Frame, main and take-off bearing mounts, gear housing and base are of all-welded construction—as structurally stable as though cast in a single unit. Steel tube of high tensile strength is statically and dynamically balanced. Gear box is designed to produce any lay within the range of lays required for its size and type. All high-speed gears are fully enclosed; they operate in a continuous oil bath. Supporting rollers of the best quality highly compressed fibrous material are mounted on spindles running in adjustable ball bearings. Bobbin latches and bobbin brakes are of new design and semi-automatic in operation.

Full information available upon inquiry. Your priority rating may permit of immediate consideration.

Write for Illustrated Manual



Size No. 6" x 7 Wire, 7 Bobbin Strander . . . Length 24' 6" from center of winding reel mounting to end of strander motor. Width of strander 31". Approximate gross weight for domestic shipment 3,000 lbs. Reel stand shipping wgt. 450 lbs.

ROBINSON MANUFACTURING COMPANY
WORKS — MUNCY, PENNA.
Sales & Executive Offices — **30 CHURCH STREET . . . NEW YORK, N. Y.**

UNIQUE

Apprentice Training Doubled

WAR production demands have almost doubled the number of approved apprenticeship programs during the past 12 months, Chairman McNutt of the War Manpower Commission, announced October 7. He said the Federal Committee on Apprenticeship, a management-labor committee which has been advising the Federal Government on apprenticeship matters for 8 years, had approved 908 apprenticeship programs since October 1941.

✦ ✦ ✦

STATISTICS of the Apprentice-Training Service of the War Manpower Commission show 1,974 approved programs now in effect as against 1,066 reported a year ago. Of the total in effect, 1,086 are programs to meet the specific training requirements of individual establishments, most of which are producing war materials or those essential to civilian industries or services. The remaining 888 are trade programs, covering the training of apprentices in a recognized craft within a city or other specific geographical area. During the past year 241 craft programs, slightly more than one-third of the total, were approved.

✦ ✦ ✦

PROGRAMS conforming to the minimum standards advocated by the Federal Committee on Apprenticeship are now found, the chairman said, in 45 States, the District of Columbia, Puerto Rico, and Hawaii. Covered are more than 50 apprenticeable trades.

✦ ✦ ✦

THE greatest single advance reported for one industry was for machinery and machine tools establishments. Of the 465 approved programs now on the books, 273 were approved since October last year.

✦ ✦ ✦

IN other key war industries, 170 of the 257 metal founding and fabricating, 23 of the 46 aircraft and airline, and 9 of the 17 shipbuilding programs have been approved during the past 12 months.

✦ ✦ ✦

FORTY new carpenters and millmen craft programs have been added during the past year boosting the total for the country to 151. Other conspicuous gains have been in craft programs for electricians from 66 to 100, and for plumbers and steamfitters from 112 to 144.

✦ ✦ ✦

Robinson Issues New Literature

"BULLETIN No. 300" of the **Robinson Manufacturing Company**, 30 Church Street, New York, is a convenient, colorful file-size reference piece which illustrates and briefly describes latest developments in and additions to the Robinson "Unique" line of Mixers, Sifters, Cutters, Crushers, Grinders, Attrition Mills, Hammer Mills, Pulverizers and Rubber Reclaiming Equipment. Informative and useful for every phase of the processing industries. Write directly to the manufacturer for complimentary copies.

THE WIRE ASSOCIATION

What It Gives You for $10.00 Annual Dues

1. **WIRE & WIRE PRODUCTS —For One Year.**
   The official publication of The Wire Association covering the Wire Industry; its Metallurgy, Technology, Research, Processes, Machinery and Personnel.

2. **THE ANNUAL BUYERS GUIDE & YEAR BOOK OF THE WIRE ASSOCIATION.**
   The Year Book Section contains: Constitution and By-Laws of The Wire Association; Details of year's meetings, etc.; List of Members, Index to Papers and Articles in WIRE & WIRE PRODUCTS.

3. **QUESTION AND ANSWER SERVICE.**
   Answers to technical and operating problems direct by mail. Available to members only.

4. **ANNUAL CONVENTION AND EXHIBITION.**
   (In Association with American Society for Metals and The National Metal Congress.) Technical Sessions, Plant Inspections.

5. **REGIONAL MEETINGS.**
   Attendance at the regional meetings which include Local Plant Inspections, Technical Sessions and Discussions.

6. **PERSONAL CONTACTS.**
   Both at Annual and Regional Meetings, and throughout the year, for interchange of helpful information.

7. **INFORMATION SERVICE ON MACHINERY, EQUIPMENT AND SUPPLIES.**
   The Technical, Catalogue and Correspondence Files of the Wire Association hold the answer to practically every "Where can I buy" problem. This service is available to members without charge.

For detailed information address

RICHARD E. BROWN—Executive Secretary

300 Main Street — Stamford, Conn.

New Alloy to Save Scarce Metals

EIGHTEEN tons of scarce metals will be saved in the manufacture of **General Electric** war products this year, thanks to a new **non-magnetic** manganese alloy.

✦ ✦ ✦

THE new alloy will free 10 tons of nickel, seven tons of chromium and almost one ton of tin for other war uses. All three metals are listed by the War Production Board as "inadequate for war and most essential uses" while manganese, the substitution of which makes the saving possible, is available in adequate quantities.

✦ ✦ ✦

THE new alloy replaces a formula which called for 18 per cent chromium, eight per cent nickel and the remainder iron. Either alloy requires a covering to **permit soldering**, and for the tin coating previously used, a lead coating has been substituted. Adequate supplies of lead are available.

✦ ✦ ✦

ACCORDING to **J. Q. Adams**, steel specialist in the Company's Schenectady works laboratory, the new formula provides a much stronger alloy.

✦ ✦ ✦

"THIS alloy can therefore be expected to remain in general use when the war ends and chromium, nickel and tin again will be in common use," he said.

✦ ✦ ✦

BARS, rods and plates made of the new alloy are used in motor-generators for submarines, control equipment for planes and tanks, and in switchgear equipment and motors for war industry generally. Wire made of the alloy has equally wide application, chiefly in electric locomotives. In this application the wire is wound tightly around **the armatures of direct-current motors and soldered.**

✦ ✦ ✦

Heat Treating Bombs and Projectiles

A FOUR-PAGE mailing piece describing and illustrating heating equipment adapted to this subject, has been issued by **Surface Combustion**, Toledo, Ohio.

✦ ✦ ✦

THIS covers furnaces for heating the billets, a Rotary Hearth Furnace for shell nosings, a Forge Furnace for heating bar stock for forging, a Direct Fired Furnace for bars for 75mm shells, Drawing Hardening and Quenching Units for 75mm. to 155mm. shells, and Clean Hardening Furnaces for 37 mm. shot.

✦ ✦ ✦

OTHER new folders recently issued are entitled:

SC-102 "SC Standard Rated Industrial Furnaces."

SC-103 "Ships, Tanks and Planes."

SC-104 "Cartridge Cases."

✦ ✦ ✦

COPIES of any of these bulletins will be mailed by the Company upon request.

When writing your suppliers, please tell them you saw their advertising in WIRE & WIRE PRODUCTS. It helps them and it helps us. Because of their advertising we are able to render a valuable editorial service to our field. It's the American Way!

BACK of the TECO trademark is a quarter century of experience in the development and manufacture of Tungsten Carbide. Rigid control of every step in the manufacture of the carbide and fabrication of the dies, gives TECO Carbide Dies their unusual capacity for high-speed, long-run production of smooth, on-size wire.

TECO Carbide Dies provide a tried and proven way to step up your output. To convince yourself, equip one machine with TECO Carbide Dies—then check the quality and quantity of your production against previous runs. Our engineers will gladly discuss your needs.

Wire and Bar Dies
Extruding Dies
Tubing Dies
Sizing Dies

Also

Carbide Blanks
Tools, Bits
Reamers and
Forming Tools

TUNGSTEN ELECTRIC CORPORATION
564-39th STREET UNION CITY, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects and Builders Bldg., Indianapolis, Ind.

TECO — Pioneers in Tungsten Carbides for over a Quarter Century — CARBIDE DIES

A Review of Recent Wire Patents

No. 2,297,895, COILED-COIL PRODUCT AND METHOD OF AND APPARATUS FOR MAKING THE SAME, patented October 6, 1942 by Samuel Karasick, Mount Vernon, N. Y.

The method comprises moving the primary helix through a predetermined path and in individually separating adjacent turns of the primary helix to produce a secondary helix.

✦ ✦ ✦

No. 2,298,324, ELECTRICAL CONDUCTOR, patented October 13, 1942, by Robert R. Williams, Roselle, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

A communication cable is provided including a flexible wire conductor having a flexible insulating sleeve, which consists of a pure polymerization product of a substituted benzene, in which each substitute radical comprises a vinyl group, said polymerization product being as unplasticized, synthetic, organic product which is homogeneous, isotropic, and substantially non-hygroscopic, and free from hydroxyl groups.

✦ ✦ ✦

No. 2,298,433, SPRING STRUCTURE, patented October 13, 1942 by Enos C. Throop, Jackson, Mich., assignor to Reynolds Spring Company, Jackson, Mich., a corporation of Delaware.

Helical wire springs are associated with a number of pairs of resilient longitudinally extending wires, having, along their lengths bands to render the wires longitudinally expansible and contractible. The latter wires support the helical springs.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

✦ ✦ ✦

No. 2,298,513, PROTECTIVE COATING, patented October 13, 1942, by Harry E. Rogers, Chicago, Ill., assignor to Teletype Corporation, Chicago, Ill., a corporation of Delaware.

A tarnish and rust preventing process is provided and consists in dissolving lamb's wool fat in trichloroethylene in the proportion of from 12 to 20 per cent by weight, heating the solution in an open top vessel to a temperature of from 150 to 190° F., cooling the vapors overlying the solution to subdue evaporation, immersing piece parts in said solution for a period of exposure of from 15 to 30 seconds according to the mass of the piece parts, and withdrawing the piece parts by moving them upwardly rapidly through the subdued evaporation zone overlying the solution.

✦ ✦ ✦

No. 2,298,654, ELECTRIC POWER CABLE, patented on October 13, 1942, by Thomas Robertson Scott, John Krauss Webb, and Stanley George Foord, London, England, assignors to International Standard Electric Corporation, New York, N. Y.

More specifically, the invention lies in the dielectric covering of the wire and consists in winding a tape, comprising soluble solid insulating material, about the wire, covering the tape with a substance to delay solvent action on the material and basting the tape, at intervals, during winding, with a solvent for the material.

✦ ✦ ✦

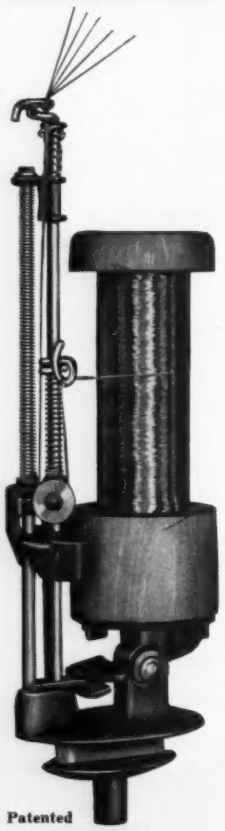
No. 2,298,748, METHOD OF MAKING ELECTRIC CABLES, patented on October 13, 1942, by George R. Brown, Newark, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This method comprises providing a sheath of disconnected, thermoplastic material-coated, textile threads about the wire conductors, and subjecting the sheath to heat and pressure to alesce the thermoplastic material on the threads into a continuous seamless substantially structureless body having embedded therein as a skeleton the discontinuous structure of textile threads.

✦ ✦ ✦

No. 2,299,505, SPRING SIZING MACHINE, patented on Oct. 20, 1942, by Charles H. Shaffer, Lancaster, N. Y.

Coiled wire springs are sized by means of the use of two segmental dies, one



Patented
2 BX - Special
MOSSPEED Carrier.

MOSSPEED BRAIDER CARRIERS
FOR BRAIDING
MULTIPLE ENDS OF FINE WIRES

A special design MOSSPEED CARRIER and BOBBIN is supplied for braiding "SHIELDED" WIRE & ETC.

Will braid multiple ends of fine aluminum, brass, bronze or copper wire, Etc.

SHEAVE-WHEEL on braider-stop and SPECIAL-THREADEYES on carrier, together with new type BOBBIN provides an even wire "let-off" resulting in a high quality and uniform braided shield.

Consult our engineers regarding your braiding problems.

MOSSBERG
Pressed Steel Corp.
18 West Street
Attleboro, Massachusetts, U. S. A.
European Agent
James Day (Machinery), Ltd., The Grange, Whetstone, Nr. Leicester, England
Ross Whitehead & Co., Ltd., Montreal and Toronto, Canada.

being stationary, and the other movable toward and away from the first, both having teeth, but staggered, one from the other, and graduated in height so that they may successively enter between the coils.

✦ ✦ ✦

No. 2,300,336, MAGNETIC ALLOY OF IRON AND ALUMINUM, patented on Oct. 27, 1942 by Richard M. Bozorth, Short Hills, and Howell J. Williams, Chatham, N. J., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

This alloy consists of iron with 2 to 10 per cent aluminum caused to have anisotropic grain structure and high anisotropic permeability along one coordinate axis of the material at high flux densities by forcible elongation while cold followed by heating to a temperature at or above 600° C. and below 1425° C.

✦ ✦ ✦

No. 300,381-2, FILTER AND METHOD OF MAKING FILTERS, patented on Oct. 27, 1942 by Charles L. Hardy, Waban, Mass., assignor to Joseph T. Ryerson & Sons, Inc., Chicago, Ill., a corporation of Delaware.

These patents cover a wire filter having transversely crimped, stiffly resilient warp wires, associated with straight, stiffly resilient warp wires, and helically coiled transversely crimped weft wires, all retained to prevent relative longitudinal movement of adjacent turns of the weft wires.

If You Are Not A Member of The Wire Association — Now Is A Good Time to Join!
The Annual Dues Are $10.00—For detailed information address
RICHARD E. BROWN, Secretary
THE WIRE ASSOCIATION
300 Main Street, Stamford, Conn.

Low Pressure Welding Gun Introduced

WHEN welding brackets or clips to light gauge alloy steels, light welding pressure is required in order not to deform the metal. A gun designed for such welding operations has been introduced by **Progressive Welder Company**, 3050 E. Outer Drive, Detroit.

✦ ✦ ✦

GUN operating pressure is hydraulic with partially counterbalancing continuous air pressure. The latter also serves to automatically retract the points when hydraulic pressure is released, thereby simplifying operation.

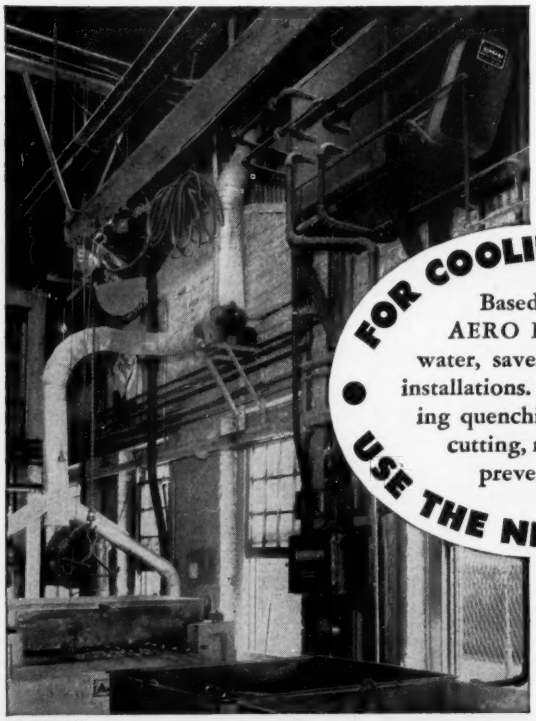
✦ ✦ ✦

FEATURES of the gun include screw-adjustable stroke (up to 3 inches) to take care of a wide range of work sizes, and quick interchangeable adapters for electrodes to make the gun suitable for a wide variety of work shapes. P-H concentric kickless and highly flexible welding cables and electronic controls are used in the complete assembly.

✦ ✦ ✦

New Leaflets on Degreasing Solvents

TWO new illustrated leaflets describing the high stability of Perm-A-Clor degreasing solvent under adverse operating conditions, are now being issued by the **Detroit Rex Products Company**, 13005 Hillview Avenue, Detroit, Michigan. This chlorinated solvent is non-flammable and is used for cleaning all kinds of metal parts.


PATENTED

NIAGARA AERO HEAT EXCHANGER offers the improved low-cost method of cooling quenching liquids, saving water and giving increased production with uniform physical properties and fewer rejections.

FOR COOLING WATER, OILS AND SOLUTIONS

Based on the principle of evaporative cooling, the NIAGARA AERO HEAT EXCHANGER saves 95% of the cost of cooling water, saves power and costs less to install in both large and small installations. It is applied to a wide variety of industrial liquids, including quenching liquids, jacket water, broaching, grinding, machining, cutting, rolling, and drawing coolants and lubricants. Closed system prevents contamination. Write for Bulletin 90.

USE THE NIAGARA AERO HEAT EXCHANGER

NIAGARA BLOWER COMPANY
Dept. WP-122
General Sales Office: 6 E. 45th Street, New York City
37 W. Van Buren St., Chicago, Ill.
Fourth & Cherry Bldg., Seattle, Wash.
673 Ontario St., Buffalo, N. Y.
District Engineers in Principal Cities

NIAGARA INDUSTRIAL COOLING • HEATING • DRYING HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Coating Nylon, Formvar Etc. on Wire

(*Continued from Page 714*)

on the wire and become heavier on the side furthest from the source of heat.

✦ ✦ ✦

FOR best results heat should be applied to the large sizes of wire in equal quantity and intensity from all sides of the wire. That is, the wire should pass through the "Heat Center" of the baking oven and this may not correspond to the measured center of the oven.

✦ ✦ ✦

THE ideal wire enameling oven from the viewpoint of uniform heat would be one having heat sources of exactly equal intensity equidistant from the wire on all sides, or in other words having each coated wire passing coaxially through the exact center of a uniformly heated circular tube.

COMMERCIALLY, where a box type vertical wire enameling oven is being used, it has been found that excellent results can be obtained when heat is supplied from opposite sides of the oven in such a manner that heat in equal quantity and intensity reaches the surface of the coated wire simultaneously from all directions. This produces a thorough, uniform bake and does not distort the wet film of enamel on the wire before the solvent can be evaporated and the coating set. Thus, if the wet coating is applied evenly and baked uniformly, enameled wire of high quality can easily be made with the new synthetic coatings.

✦ ✦ ✦

THE foregoing information regarding cone shaped dies, self aligning die holder and suggestions for heat distribution in the baking oven, are offered to manufacturers of magnet wire for use as they see fit as a matter of service to the industry.

Motion Picture Lessons in Grinding

EVER since the training of apprentices in war-work plants became a problem there has been a demand for practical information on grinding methods. To meet that demand we have produced a new series of motion pictures entitled "Lessons in Grinding".

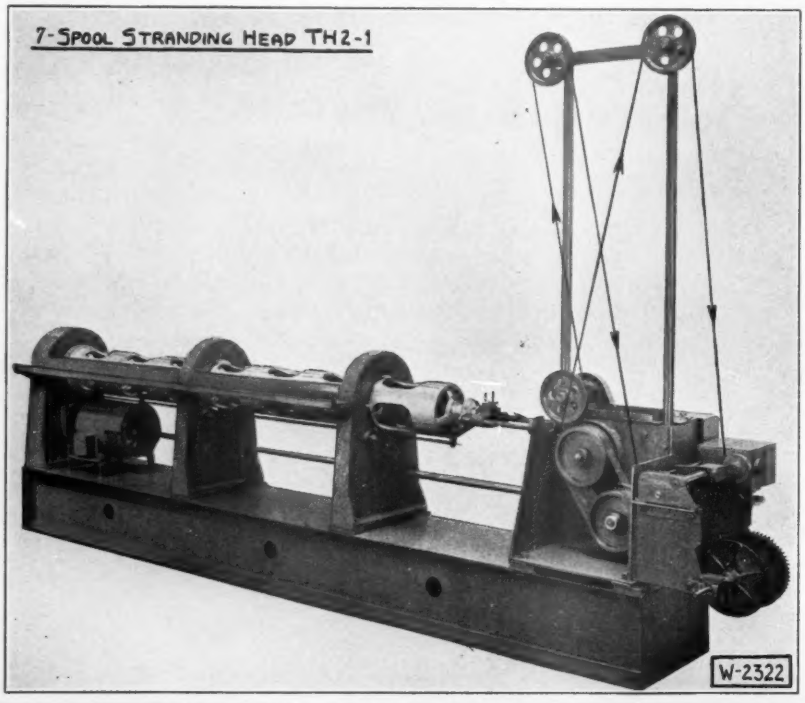
✦ ✦ ✦

THESE apprentice training films are now ready for distribution and are available to industrial apprentice schools, army and navy training schools, all other classes where machine shop practice is being taught, colleges, universities and vocational schools. The films are intended to present merely the fundamentals of grinding in a way that the inexperienced man can understand them.

✦ ✦ ✦

ARRANGEMENTS may be made for booking this film through the Publicity Department of Norton Company, Worcester, Mass.

THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY, U.S.A.
ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY



HIGH SPEED TUBULAR STRANDING HEADS "TH"

PLEASE NOTE:—

1. COMPACT DESIGN
2. RIGID CONSTRUCTION
3. DYNAMICALLY BALANCED ROTOR
4. SUPER-SENSITIVE ELECTRIC STOPS FOR FINEST WIRES
5. 3-SECOND AIR BRAKES
6. DOUBLE-GROOVED CAPSTANS
7. POSITIVE LAYS IN 11 TO 1 LAY RANGE
8. AUTOMATIC - AJUSTABLE SINGLE - SCREW TRAVERSE
9. TUNGSTEN - CARBIDE GUIDES
10. RIGHT & LEFT HAND ASSEMBLY (RIGHT HAND SHOWN)

Outstanding Personalities of the Wire Industry

(*Continued from Page 725*)

land Cliffs Iron Company since 1934. He was educated at Yale University and at the Case School of Applied Science. During the first World War, he served as Chief of the Crane Section of the War Industries Board.

✦ ✦ ✦

New Directors for Keystone Steel & Wire Company

THEODORE C. BAER, counsel of the Keystone Steel & Wire Company has been elected a director succeeding **A. G. Heidrich**, and **A. H. Sommer**, superintendent of the steel mills, has been made a director to fill the unexpired one-year term of the late **Charles W. LaPorte.**

✦ ✦ ✦

RE-ELECTED for three-year terms are **W. H. Sommer**, president and **D. P. Sommer**, vice president and general superintendent.

✦ ✦ ✦

Charles H. Norton

THE death, on October 27, of **Charles Hotchkiss Norton**, 91, has been noted with deep regret. Mr. Norton, who had long been associated with Norton Company, Worcester, Mass., was an inventor whose genius is credited with having made one of the greatest contributions by any individual to American mass production methods. He was known as the "father of cylindrical grinding."

✦ ✦ ✦

A NATIVE of Plainville, Conn., Mr. Norton died at his home, Sharpenhoe, Red Stone Hill.

✦ ✦ ✦

MR. NORTON first became associated with Norton Company in 1900 when the then Norton Emery Wheel Co., founded the Norton Grinding Co., with Mr. Norton as designer and chief engineer, to introduce his methods of cylindrical grinding, and to manufacture machinery of his invention and design. When Norton Grinding Co. was merged with Norton Company in 1919, he became chief engineer for the machine division. He has not been actively associated with the company for a number of years because of his advanced age.

F. V. Lindsey, Official of Driver-Harris Co., Dies

FREDERICK VAN VOORHEES LINDSEY, Vice President and General Sales Manager of the Driver-Harris Company, Harrison, N. J., manufacturer of special alloys, died November 16th, 1942 at the Memorial Hospital, New York City after a brief illness.

✦ ✦ ✦

MR. Lindsey was born in Streator, Illinois, but resided in Chicago until 1916 when he moved to Morristown, New Jersey, where he became associated with the Electrical Alloy Company, manufacturers of nickel alloys, as Vice President and General Manager. In 1925, when the Electrical Alloy Company was absorbed by the Driver-Harris Company he was elected Vice President and

(*Please turn to Page 739*)

THE MORDICA MEMORIAL LECTURE FOR 1942

BY LOUIS H. WINKLER

METALLURGICAL ENGINEER,

BETHLEHEM STEEL COMPANY,

BETHLEHEM, PENNSYLVANIA

On the Subject

"STEEL & WIRE"

WILL BE PUBLISHED IN COMPLETE FORM WITH CUTS AND FULL EDITORIAL NOTES IN THE JANUARY CONVENTION PROCEEDINGS ISSUE OF WIRE & WIRE PRODUCTS

WIRE & WIRE PRODUCTS

300 Main Street — Stamford, Conn.

Phone Stamford 3-0482

ODT Concedes War Value of Business Conventions

Eastman cites use of war agencies in interview.

IN the October, 1942, issue of World Convention Dates it states:

✦ ✦ ✦

"EVERY association executive knows that in June of this year Joseph B. Eastman, Director of the Office of Defense Transportation, issued a widespread request to associations, asking them to defer their conventions. What many executives do not know is that late in August Mr. Eastman greatly eased the ban. In an interview accorded a trade newspaper—the New York Journal of Commerce—the ODT Director revealed that Government use of business conventions as a means of educating business men to the needs of the war program has influenced the ODT to rule that travel to conventions is a permissable use of transportation facilities.

"MR. EASTMAN said that earlier in the year the ODT believed that conventions should not be held unless they are related to the war effort, that as few people as possible should attend them, and that they should occupy as short a time as possible," the reporter stated. "This suggestion was in accord with the announced purpose of the ODT to limit civilian travel as much as possible.

✦ ✦ ✦

"DURING June and July, however, it became apparent that the War Production Board, the Office of Price Administration and other Government war agencies were taking advantage of conventions to educate business and professional men to the war program. Conventions held so far this summer, according to records of the Department of Commerce, have been concerned primarily with Government activity. Government agencies have made detailed preparations to send officials to all conventions to be held in September and October."

MR. EASTMAN told the interviewer that it is unnecessary for associations to obtain ODT approval before holding a convention. "There is no further use in applying to this office for approval of their conventions," he is quoted as saying. "We cannot say whether or not their conventions are going to be in the interest of the war program. We'll have to trust them to confine their convention activities to war needs."

✦ ✦ ✦

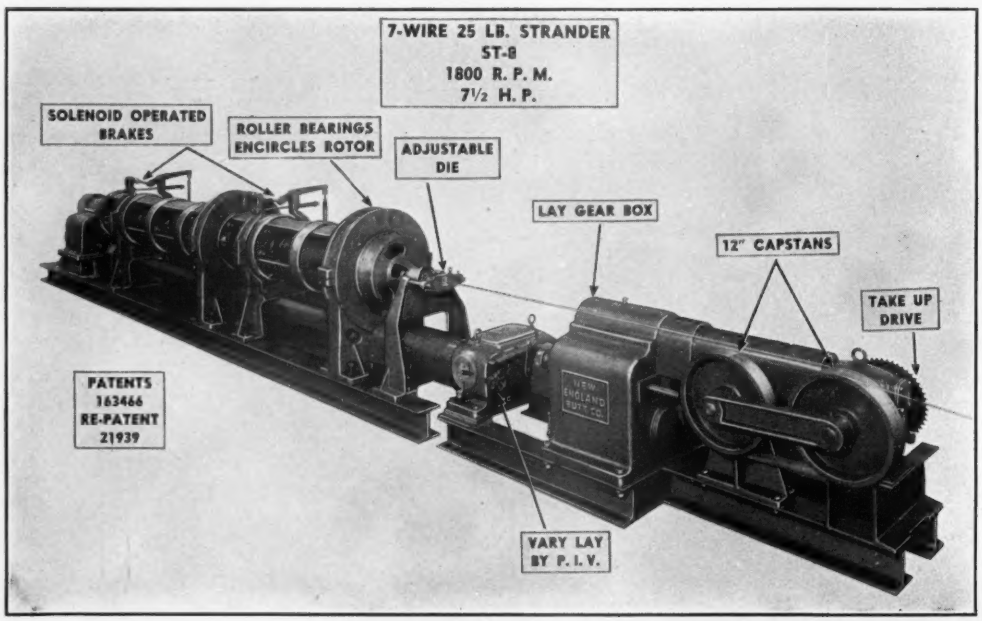
Canadian Priorities Division Established

ESTABLISHMENT of a Canadian Division to handle Canadian priorities problems in the Office of Operations of the War Production Board was announced recently.

✦ ✦ ✦

JOE TUCKER will be director of the new division, with headquarters located with the Department of Munitions and Supply, Ottawa, Canada.

HIGH SPEED STRANDER that is DIFFERENT



ROTOR
The rotating section is of welded steel construction with suitable openings on three sides for loading spools.

ROTOR BEARINGS
The rotor runs in large roller bearings which encircle the rotor. This construction reduces noise and vibration and will give a smoother operating machine than is obtained with the ordinary supporting roll construction.

DRIVE
Motor drives through V-Belts and Rawson Automatic Clutch to rotor. Steel reduction gears in bearing housing at rear of the machine reduce the drive to the haul-off which runs full length of the machine.

HAUL-OFF
The haul-off is the grooved double drum type, driven through a P. I. V. transmission, a lay box, and worm gear reducer.

TAKE-UP
The take-up, not illustrated, is rigid in construction and equipped with automatic single thread screw and adjustable traverse.

NEW ENGLAND BUTT CO., PROVIDENCE, RHODE ISLAND

1842 — 100 YEARS YOUNG — 1942

CREATION of the Canadian Division is a further step toward coordination of munitions production, materials distribution and priorities controls in the United States and Canada. The division will further effectuate the policy of placing firms engaged in war production on both sides of the border on an equal footing with respect to distribution of materials.

✦ ✦ ✦

AS previously announced, Canadian companies engaged in war production are now eligible to receive priorities assistance in obtaining materials from the United States under the Production Requirements Plan or, upon special authorization, under the various preference rating orders applicable to similar American companies.

✦ ✦ ✦

THESE steps have been taken pursuant to the Hyde Park agreement on cooperation between the United States and Canada announced by President Roosevelt and Prime Minister Mackenzie King on April 20, 1941, and the declaration of policy by the Joint War Production Committees of Canada and the United States approved by President Roosevelt on December 30, 1941.

✦ ✦ ✦

New Booklet on Jetal Process

DATA from the research files of the **Alrose Chemical Company**, Providence, R. I., has been compiled into an illustrated booklet, describing the Jetal Process, by which ferrous surfaces may be given a protective black finish.

✦ ✦ ✦

THE subject matter shows a typical installation, indicates applications, gives data on both temperatures, bath composition, surface hardness, protective values, and the penetration and wear resistance of oxide coatings.

✦ ✦ ✦

THE Process is said to increase production, reduce heat treatment time, and secure resultant economies.

✦ ✦ ✦

OTHER important Alrose products, as finishes for copper and so forth, are also mentioned in the book, together with a list of offices where engineering service is available.

SUPERIORITY PROVED!

THE *Trauwood* PROCESS

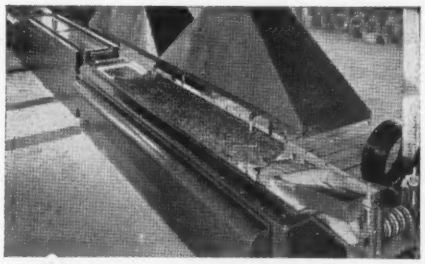
PATENTING
TEMPERING
ANNEALING

Wire Mill Installations of TRAUWOOD equipment for the continuous strand heat treatment of wire, rod and strip have proved:

Higher and More Uniform Physical Properties!

Faster Speeds — Greater Production!

Extreme Flexibility!



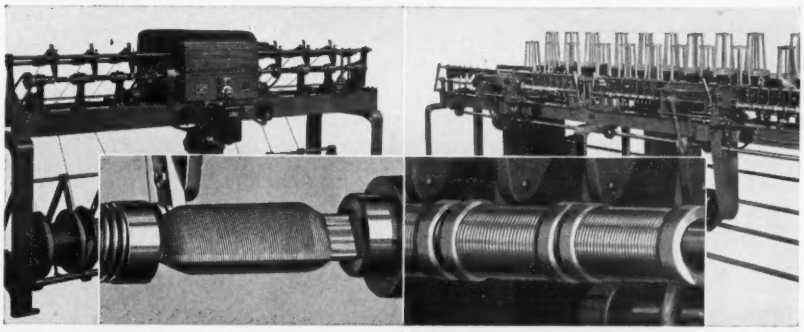
Trauwood Electric Wire Tempering and Patenting Unit

Investigate this newest development in the scientific heat treatment of carbon and alloy steel rod, wire and strip. Write today.

THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U.S.A.

WIRE SPOOLING MACHINES



On Sticks or Spools . . . from Reels or Coils

Typical of FIDELITY Spooling Machines that you find serving every spooling-operation need of wire industry, these two new types command attention to advanced achievements in precision winding of the wire onto little flat sticks or conventional spools, at new high production rates and new low spooling cost.

You'll be interested especially in the new FIDELITY hydraulic control which eliminates gear changes . . . so write for Bulletin #61.

WIRE SPOOLING, TAPING, WINDING, SINFRA KNITTING, BRAIDING MACHINES

FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE, PHILADELPHIA, PA.

FINE WIRES

in sizes as small as .002" of

ALUMINUM COMMERCIAL BRONZE
SILICON BRONZE
BERYLLIUM COPPER
EVERDUR BRASS NICKEL-SILVER
SPECIAL ALLOYS
PHOSPHOR BRONZE
STAINLESS STEEL

. . . and other metals and alloys are available for: Brushes, sieves, strainers, control cables, airplane bonding jumpers, wire cloth, instruments, springs, and other applications.

If your product requirements call for fine wires of uniform characteristics consult with Callite. Our engineers will be glad to cooperate with you in finding the most economical and efficient solution to your wire problems.

CALLITE TUNGSTEN CORPORATION
572-39 Street, Union City, N. J.
Branch offices: Chicago, Cleveland.

CALLITE TUNGSTEN CORPORATION CT

REG. U. S. PAT. OFF.

Callite Wires

A FINE WIRE FOR EVERY NEED

Equipment Once Tagged "Scrap" Now Producing Alloy Steel

EQUIPMENT which was tagged "scrap" and scattered over three cities and two States a year ago is a major producer of alloy steel today. ✦ ✦ ✦

THAT "scrap" is now a monument to American industrial initiative in the form of a modern, efficient alloy steel plant of the American Rolling Mill Company at Middletown, Ohio. The "homespun" unit was dedicated at Middletown July 29 by H. Leroy Whitney, chief of specifications section, War Production Board, representing the Government and Calvin Verity, executive Vice President and General manager of Armco.

✦ ✦ ✦

COST of the plant is believed to represent the lowest capital investment per net ton of output of any alloy steel plant built during the emergency.

✦ ✦ ✦

EARLY in 1942 Armco learned that the Naval Ordnance Plant at South Charleston, West Virginia, which had been idle since World War I, was being revamped and three electric furnaces were to be scrapped. The steel company obtained permission from the Navy Department to purchase and dismantle the furnaces. In Cincinnati, Armco located a used building, equipped with two overhead cranes. An old charging machine was purchased and rebuilt. ✦ ✦ ✦

THE only new equipment in Armco's alloy plant consists of electric transformers.

If you *MAKE* or *USE* WIRE
YOU NEED ONE OF THE MANY

Porter Cutters

Indispensable in wire mills for sampling large wire.

In almost universal use by wire fabricators for cutting reinforcing fabric, fencing, spring wire, etc.

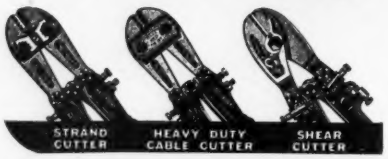
Useful in any plant—large or small—for all sorts of maintenance and repair work—for cutting bolts, rods, wires, rivets, wire rope, chains, or for splitting deformed or "frozen" nuts.

There is a standard Porter tool for every cutting job up to ¾" annealed bolts or ½" hardened chains. Special cutters designed to fit your industry's needs.

Send for Catalog of PORTER CUTTERS.

SEND FOR CATALOG

H. K. PORTER, INC.
EVERETT, MASS.



DuPont Develops New Method for Recovery of Copper From Plating

A NEW method for recovering copper by deplating it from plated iron and steel scrap has been announced by the Electroplating Division of E. I. duPont de Nemours & Company.

✦ ✦ ✦

VIRTUALLY 100% of the copper, a vital war material, is recovered in a form satisfactory for direct use in electroplating im-

APCO MOSSBERG STEEL REELS & SPOOLS

Standard Equipment in War as in Peace

Apco Mossberg Steel Reels are standard throughout the wire industry – and for good reason! Apco Mossberg – the original Frank Mossberg Co. – *originated* the steel reel idea and have been training workmen in their manufacture ever since. That is why Apco Mossberg Steel Reels are preferred where the pressure of wartime production schedules is heaviest.

FREE ENGINEERING SERVICE

We will gladly submit drawings, blueprints, or suggestions without obligation to you. Write for quotation today.

APCO MOSSBERG CO.
(The Original Frank Mossberg Co.)
21 Lamb Street . . . Attleboro, Mass.

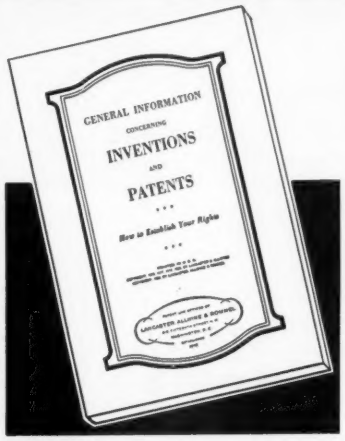
HOW TO SAVE ACID IN PICKLING

Controlling the amount of acid used and its action on metal in essential production pickling operations is today a problem facing many wire and wire products plants.

This FREE 12-page manual gives you many helpful ideas for meeting this situation. Besides saving acid, it shows how to conserve metal, eliminate over-pickling, reduce acid fumes and inhibit rust. A valuable handbook for every wire mill executive, it is YOURS for the asking. Write for it today!

OAKITE PRODUCTS, INC.
52A THAMES ST. NEW YORK, N. Y.
Representatives in All Principal Cities of the United States and Canada

OAKITE CERTIFIED CLEANING
MATERIALS . . METHODS . . SERVICE



Send for a copy - it's free.

Interesting Booklet concerning Inventions, Patents, Trade-Marks and Copyrights, together with Schedule of Government and Attorney's fees, sent free on request. Simply ask for "booklet and fee schedule."

No charges are made for preliminary advice, either in connection with patent, trade-mark or copyright cases.

Lancaster, Allwine & Rommel
Registered Patent & Trade-Mark Attorneys
438 Bowen Bldg., Washington, D. C.

portant metal parts for military equipment, the company said. Large quantities of strip steel and iron may be made available for reuse.

✦ ✦ ✦

FORMERLY, removal of copper plate was costly and most of the copper was wasted. Complete deplating under the new method is carried out rapidly under controlled operating conditions. Deplating takes place without attack of the base metal, in sharp contrast to usual stripping methods.

✦ ✦ ✦

MANY war products are fabricated from copper-coated steel strip. Resulting scrap metal is useless until the copper has been removed.

✦ ✦ ✦

Rubber Guide

DESIGNED to present maximum information in accessible, indexed, condensed form, The B. F. Goodrich Company has published a 30-page Rubber Guide Book for American War Industries, listing the application and properties of many types of products for industrial and aeronautical purposes using natural, synthetic or reclaimed rubber.

✦ ✦ ✦

WELL illustrated throughout, the booklet is divided into 11 indexed sections, under the following headings:

✦ ✦ ✦

PROPERTIES of Ameripol hydraulic equipment parts, sponge products, industrial rubber gloves, extruded rubber goods, Anode process of rubber coverings, industrial and aeronautical molded goods, hard rubber parts, rubber cements, lathe cut rubber goods, and properties of reclaimed rubber.

✦ ✦ ✦

SUB-ZERO test data, diameter, volume, thickness and hardness tests in oil, and suggested uses for various Ameripol compounds are also given, with cross-sectional drawings to add to the clarity of the presentation.

✦ ✦ ✦

THE booklet will be mailed upon request, from the company's principal offices in Akron, Ohio.

Have You a Drawing Problem?

WIRE DRAWING LUBRICANTS
for every purpose

G. WHITFIELD RICHARDS
1732-36 Carlton St.
PHILADELPHIA, PA.

Coatings for Drawing Stainless, Low & High Carbon and Copper Coated Wire

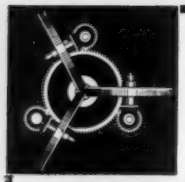
Gilron

"Gilron" Coating Compounds increase drawing speed of stainless steel wire considerably. Multiple reductions can be drawn without recoating. Excellent results on welding wire.

Better Looking Finish
No Scratching
Longer Die Life

Please write for full particulars.

Gilron Products Co.
1559 East 40th Street • Cleveland, Ohio



WIRE MEASURING MACHINE

FOR LINEAR MEASURE

PROVIDES NEW STANDARD OF ACCURACY

Illustration Shows Exclusive Patented "3V" Principle

Measuring twisted, armored, bare or insulated wire without vibration or inaccuracies at any speed or varying speeds!

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LYON-VAIL MACHINE CO., INC.

97 Belmont Street, BROCKTON, Massachusetts

LYONBILT SPECIAL MACHINES

NILSON AUTOMATIC PRESS AND FOUR SLIDE MACHINE

FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

For Complete Details Address —

THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.

250 TUBE BENDS PER HOUR

Girl Operator Makes 1000 Tubes Per Day

Forming 125 steel tubes per hour with 2 accurately placed, uniform bends is "duck soup" for the handy and versatile Di-Acro Bender No. 1, which also bends angle, channel, wire, moulding, strip stock . . . Together with the Di-Acro Shear which squares or strips, makes slits or notches, and the Di-Acro Brake which forms angles, channels, "Vees", etc.—a great variety of metal parts can be formed to duplicated accuracy of .001"—Metal Duplicating Without Dies!

DI-ACRO PRECISION MACHINES

Write for Catalog

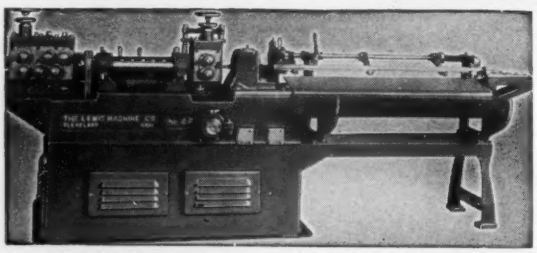
O'NEIL-IRWIN MFG. CO.

303-8th Ave. S., Minneapolis, Minn.

"The girl operator forms about 125 pieces per hour or 1000 in an eight-hour day on this machine. It has been more than satisfactory,—paid for itself in about 15 days."

BOBRICK MFG. CORP., Los Angeles, Calif.

LEWIS TRAVELCUT WIRE STRAIGHTENING and CUTTING Machines



Machines for 1/16" to ¾" rod

Round

Square

Flat

Hexagon

Ferrous and Non-Ferrous

Automatic

High Speed

Heavy Duty

The Sign of Dependable Service:

WE CAN SUPPLY AND ENGINEER OUR TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE

THE LEWIS MACHINE CO., 3445 E. 76 St., Cleveland, Ohio

Proposed Simplified Practice Recommendation for Wire Rope Before Industry for Acceptance

A PROPOSED Simplified Practice Recommendation for Wire Rope has just been submitted to producers, distributors, users, and others interested for approval or comment, according to an announcement by the Division of Simplified Practice, National Bureau of Standards.

✦ ✦ ✦

THIS recommendation, which includes sizes, constructions, grades and breaking strengths of the vast majority of tonnage of wire rope, is based on an exhaustive analytical review of existing published standards of the industry. The recommendation is designed to conserve strategic materials and available productive capacity for the war program and at the same time adequately care for important consumer requirements.

✦ ✦ ✦

GENERAL adherence to the twenty tables shown in this recommendation will result in a net reduction in variety, from 973 items to 643, or 33.9 per cent. The major production and use of wire rope, and therefore the predominant tonnage is covered by four different rope-constructions, where the reduction in variety is from 352 items to 182, or 48 per cent.

✦ ✦ ✦

THE proposed recommendation was developed by the Contact Committee of the Wire Rope and Strand Manufacturers Association and submitted for passage through the regular procedure of the Division of Simplified Practice, National Bureau of Standards, at the request of the Wire and Wire Products Section, Iron and Steel Branch of the War Production Board.

✦ ✦ ✦

DISTRIBUTORS and users of wire rope that are desirous of aiding the war program by conforming with this important conservation measure are invited to write to the Division of Simplified Practice, National Bureau of

Standards, Washington, D. C., for mimeographed copies of the proposed Simplified Practice Recommendation.

✦ ✦ ✦

The Wage and Hour Law and the Walsh-Healey Act

(*Continued from Page 716*)

the wire industry is a good example of the fact that progress is swiftest where payrolls and profits keep step.

✦ ✦ ✦

"WITH millions of employees who are new to industry joining the production front, good labor standards take on especial importance," Mr. Walling added. "Training programs work better under such conditions, foremen and supervisors find their tasks less difficult and production totals climb faster."

✦ ✦ ✦

THIS rather general discussion of the **Wage and Hour Law** and the **Walsh-Healey Act** does not pretend to answer all of the questions that individual employers may raise. Those who have special problems are urged to contact the nearest regional or field office of the newly merged Divisions which are strategically located from coast to coast.

✦ ✦ ✦

Brass Mill Scrap

BROADENING of the definition of brass mill scrap for price control purposes was announced October 23 by the OPA to embrace unused sheet, rod, tube or other brass mill products sold to a brass mill for remelting.

✦ ✦ ✦

THE definition is broadened in Amendment No. 3 to Revised Price Schedule No. 12 (Brass Mill Scrap), which became effective October 29.

✦ ✦ ✦

Die Catalog

WILLEY'S Carbide Tool Co., Detroit Michigan, has published a 32 page and cover catalog describing and giving statistical tables on their complete line of carbide cutting and drawing dies. This may be had by requesting Catalog No. 26.

Wartime

Wire for a thousand uses

Versatile Continental wire is produced in sizes from 34 gauge to ⅝ inch, in standard and special shapes . . . and in a wide range of analyses, tempers and coatings.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA

(*The Superior Sheet Steel Co., Canton, Ohio — a subsidiary*)

CONTINENTAL STEEL CORPORATION ★ SUPERIOR WIRE

CONTINENTAL STEEL CORPORATION

SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc

WIRE: Bright Basic, Annealed, KONIK, Copapered, Tinned, Special Manufacturer's, etc.

WIRE DRAWING LUBRICANTS

HIGH OR LOW CARBON WIRE, COLD HEADING, BRIGHT AND WET WIRE DRAWING.

STANDARD "WIRE DRAW"

SPECIALLY ADAPTED FOR HIGH SPEED DRAWING MACHINES
BETTER FINISHED WIRE — LOWER DIE COSTS

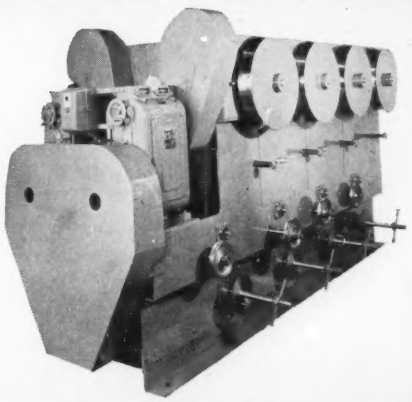
STANDARD INDUSTRIAL COMPOUNDS CO.

4600 FERDINAND STREET CHICAGO, ILLINOIS

WIRE MACHINES FOR

Drawing, Enameling, Tinning, Spooling, Insulating with Glass, Asbestos, Paper Tape, Cotton, etc. Multiple Pull-outs, Rubber covered wire Panners, etc.

One of our numerous types of Multiple Pull-outs and Take-ups for use in connection with Tinning, Annealing, and Saturating Processes, etc.



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"American" INSULATING MACHINERY COMPANY

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PHILADELPHIA PENNSYLVANIA U.S.A.

WIRE MILL EQUIPMENT *by* "STANDARD"

TURKS HEADS

Adjustable draw plates—accepted by wire trade as accurate, efficient means of producing rectangular and special shapes. With friction or power driven rolls. Catalog TH.

DRAW BENCHES

8 sizes, 2 general types. Machines are of one-man type with all controls at die end. Catalog DB.

ROLLING MILLS—STRIP AND WIRE

Roller bearing and plain bearing mills; many regular sizes or made to suit user's specific needs. Write fully.

SWAGING MACHINES

For reducing diameter of tubular and solid bar stock into cylindrical, conical, or "necked" shapes. Capacities from ½" tube, ¼" solid to 6" tube or 3¾" solid. Catalog SM.

ALSO

Hand Screw, Foot, and Power Presses; Drop Hammers, and Scrap Bundlers.

✓ your needs for this equipment and write for catalogs.

STANDARD MACHINERY CO., PROVIDENCE, R. I.

VIANNEY

Famous Wire Drawing Diamond Dies

These famous Diamond Dies
are now produced here
at moderate prices.

All sizes are in stock
or made to order
to your specifications

VIANNEY WIRE DIE WORKS

250 E. 43rd. St. New York.
V. J. Boulin, Manager

Be Sure to Specify

WILLEY'S

TUNGSTEN CARBIDE DIES

- WIRE DRAWING
- EXTRUSION
- SIZING

They have exceptional abrasion resistance, are free from porosity and take a high polish. Standard one-piece round dies from stock in many sizes. Four classifications from blank and rough cored nibs to finished dies, ready to use.

WRITE FOR CATALOG

Full information on all sizes and classifications.

Sales Engineers in Principal Cities

WILLEY'S CARBIDE TOOL CO.
MANUFACTURERS AND SPECIALISTS IN
TUNGSTEN CARBIDE TOOLS
1340 W. VERNOR HIGHWAY • DETROIT, MICHIGAN

Carboloy Develops Training Films

DESIGNED to expedite the training of new workers in the use, care and handling of carbide tools, **Carboloy Company, Inc.**, Detroit has developed and is making available for general distribution a series of six educational 35 mm. silent slide films.

✦ ✦ ✦

STRICTLY non-commercial in character the films are designed for instructional purposes and are completely self-explanatory throughout. They are intended to enable users of carbide tools to increase production, save time, reduce tool costs and tool consumption by a proper understanding of all the factors relating to their application.

✦ ✦ ✦

THE films are based largely on experience gained over several years in the operation of a training course at the Carboloy plant in Detroit where hundreds of "carbide specialists" have been trained for industrial concerns.

✦ ✦ ✦

THE complete program of visual education comprises the six films and a copy of each of the films reprinted in a booklet for reference by the trainee following the showing of the film. Each booklet also contains appendix reference material, charts, etc., of value in the daily use and handling of carbide tools.

✦ ✦ ✦

THE films will be distributed by Carboloy at print cost for use as a permanent part of the current war training programs by industrial concerns and educational institutions, etc. Arrangements are also being made for free loaning of films to educational institutions through film libraries maintained by colleges in many states.

✦ ✦ ✦

THE complete set comprises six silent slide films, covering, respectively the following subjects:

1. **What is cemented carbide?**
2. **Designing cemented carbide tools**
3. **Brazing cemented carbide tools**
4. **Chip breakers and their application**
5. **Grinding single point carbide tools**
6. **Putting cemented carbide tools to work**

ORDER YOUR COPY NOW—
LIMITED EDITION

Diamond and Gem Stone Industrial Production

PAUL GRODZINSKI

PRICE $5.00

The use of diamonds and gem stones as dies for fine wire drawing, and of diamonds for cutting tools, is comparatively recent. Today it is extensive and increasing. In this book the author has brought together all the data and information available on the subject and has added the results of his own experience and research. Although dealing mainly with the actual production of the dies and tools, the knowledge this book imparts is of prime importance to tool users. Efficiency and economy in the use of diamond and gem stone dies and tools is not possible without a knowledge of production methods.

✦ ✦ ✦

There are reference tables and a large number of specially drawn illustrations included in this book. An endeavor has been made to leave no phase of the subject untouched.

MAIL YOUR ORDER TODAY

WIRE & WIRE PRODUCTS
300 MAIN ST. STAMFORD, CONN.

IMMEDIATE RECOGNITION!

ACCORDED THIS FOUR-STAR BOOK

★ Practical ★ Original ★ Interesting ★ Complete

From all quarters has come commendation of this latest ASM book on practical metallurgy. Already four famous engineering schools—Case School of Applied Science . . . University of Wisconsin . . . Brooklyn Polytechnic Institute . . . Stevens Institute of Technology — are planning to use this book as a textbook for their courses in metallurgy.

Typical of other responses is that from Dr. Zay Jeffries, General Electric authority, who says: "The book constitutes a valuable addition to the literature of metallurgy".

If you haven't ordered your copy, do so today. You'll agree when you receive "Practical Metallurgy" that this is the finest book on this subject available today.

PRACTICAL METALLURGY

Applied Physical Metallurgy — Industrial Processing of Ferrous and Nonferrous Metals and Alloys

by

GEORGE SACHS,
Case School of Applied Science
and
KENT R. VAN HORN,
Aluminum Company of America

570 Pages . . . 355 Illustrations . . . 6x9 . . . Red Cloth Bound

$5.00

In addition to 335 general illustrations, PRACTICAL METALLURGY contains 160 constitutional diagrams covering all systems that contain an important commercial alloy. These diagrams . . . the chapters on Plastic Deformation of Ferrous and Nonferrous Metals . . . and the chapter on Internal Stress in Metals contain information not available in any other book published in this country.

Here is the book you've long wanted — a simple yet complete treatise on practical metallurgy.

WIRE & WIRE PRODUCTS
300 Main Street Stamford, Conn.

Outstanding Personalities of the Wire Industry

(*Continued from Page 731*)

General Sales Manager. He was also a member of the National Electrical Manufacturers Association.

✦ ✦ ✦

Howard D. Grant, President, Whiting Corporation

HOWARD D. GRANT, it was recently announced, has been elected President of the Whiting Corporation of Harvey, Illinois and **Stevens H. Hammond,** executive vice-president. Mr. Hammond will also serve as chief of the executive staff.

Edwin H. Brown, Asst. Chief, Iron And Steel Branch, War Production Board

APPOINTMENT of **Edwin H. Brown** of Milwaukee, Wisconsin, as assistant chief of the Iron and Steel Branch in charge of the Plant Facilities Section was announced recently by **Hiland G. Batcheller,** Chief of the Branch.

✦ ✦ ✦

MR. BROWN succeeds **Don N. Watkins,** who has resigned to return to his post as President of Steel Publications, Incorporated, Pittsburgh, Pennsylvania.

✦ ✦ ✦

THE new appointee is vice-president in charge of engineering of the Allis-Chalmers Corporation. He has been associated with that company since 1906.

✦ ✦ ✦

Brazing Literature

HANDY & HARMAN, 82 Fulton Street, New York, N. Y., announce new bulletins describing SIL-FOS, EASY-FLO and HANDY FLUX, low temperature brazing compounds for metal joining. Anyone interested may have these bulletins, plus engineering assistance for the asking.

✦ ✦ ✦

Wire Cloths

AN order limiting the number of wire cloths that can be held in inventory for use on a single paper mill machine unit was announced November 2 by the director general for operations. The wire cloths affected by the new order (L-209) are those fabricated from copper, nickel, chrome, and alloys of these metals.

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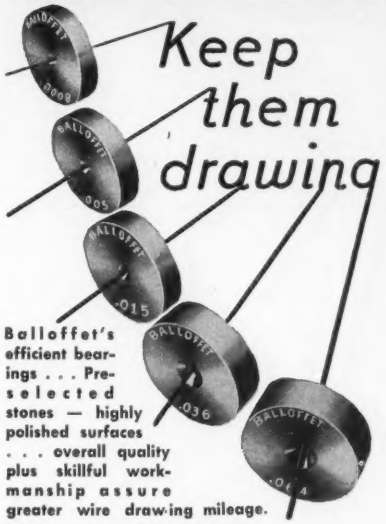
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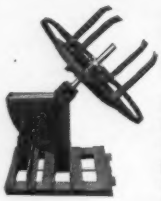
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Silver Substituted in Electrical Conductors

TWENTY-FOUR million pounds of copper have been saved in the last few months by substituting silver for copper in electrical conductors, it was announced recently by the War Production Board, Conservation and Substitution Branch, through Harvey A. Anderson, Chief.

✦ ✦ ✦

THIS saving represents enough copper to make 95,000,000 aircraft machine gun bullets, plus 600,000 anti-tank shells, plus 1,500,000 anti-aircraft shells.

✦ ✦ ✦

PLANS for substitution of silver for copper were developed before Pearl Harbor and many projects using such substitution have been inaugurated and have been accomplished through the action of the Conservation and Substitution Branch.

✦ ✦ ✦

COPPER is being replaced by silver in plants where electrical connections are a significant feature of production. Bus bars, which are large slabs of metal used to conduct up to 3,000 amperes of current, windings for transformers and similar electrical appliances are being made now with silver.

✦ ✦ ✦

A MINIMUM of 34,000 tons of silver has been allotted to the Defense Plant Corporation by the United States Treasury and must be returned after the war. The Defense Plant Corporation is lending this silver to those plants that must have large quantities for operation, that can conveniently protect the silver, and that are in operation almost constantly. The silver is made available with the stipulation that it can be used only for a non-consuming purpose.

✦ ✦ ✦

SILVER actually is a better conductor of electricity than copper; is easy to cast and roll, and is not a critical material. The amount of copper that it has replaced thus far is an appreciable percentage of total domestic copper production, and additional use of similar substitution can be expected.

✦ ✦ ✦

ACCORDING to Mr. Anderson, the opportunity for the 24,000,000-pound saving has been found in ten war plants that now are being constructed to make magnesium, aluminum, graphite, and synthetic phenol. He pointed out that plants producing zinc by electrolitic means also could make the same substitution.

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Allegheny-Ludlum Issues Booklet On Properties and Uses of Special Steels

A REVISED edition of Allegheny Ludlum Steel Corporation's "Handbook of Special Steels", which incorporates pertinent information on the various grades of stainless, tool, and other special alloy steels, has just been issued by the company and is available on request.

✦ ✦ ✦

THE Handbook, particularly adapted for use by design engineers and production men, includes complete data for guidance in the proper selection, treatment, and use of these alloy steels, with finder charts and plenty of tables to facilitate quick reference.

✦ ✦ ✦

TOOL steels are discussed with suggestions for selecting the proper grades. Under a heading "Special Products" the Handbook deals with shoe die steel, silcrome valve steels and special shapes.

✦ ✦ ✦

THERE is also contained in the book detailed information, engineering tables and other data on nitralloy steels, stainless steels, with a discussion of the pluramelt technique, electrical steels and carbon steels.

✦ ✦ ✦

A LARGE section of the book is given over to charts dealing with steel weights, and with sizes of flats and numerous other shapes.

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Norton Co., Worcester, Mass.

ACID INHIBITORS—
American Chemical Paint Co., Ambler, Pa.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ALKALINE CLEANERS—
American Chemical Paint Co., Ambler, Pa.

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Syncro Machine Co., Rahway, N. J.

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Watson Machine Co., Paterson, N. J.

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Morgan Construction Co., Worcester, Mass.
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

BENDERS—
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Callite Tungsten Corp., Union City, N. J.

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Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

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Norton Co., Worcester, Mass.

BRAKES & SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

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Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CASTINGS—Wire Mill
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

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Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
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CLEANING & PICKLING EQUIPMENT—
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Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

WHERE TO BUY, Continued

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Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

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Gilron Products Co., Inc., Cleveland, Ohio.

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Ruesch, H. J., Machine Co., Newark, N. J.

COLD HEADERS—
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American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Removing
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Standard Industrial Compounds Co., Chicago, Ill

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Niagara Blower Co., Buffalo, N. Y.

CONTROLS—Temperature
Niagara Blower Co., Buffalo, N. Y.

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Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

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Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUSTOM WIRE DRAWING—
Hy-Carbo Steel Co., Lowell, Mass.

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Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

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Porter, H. K., Inc., Everett, Mass.

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Vascoloy-Ramet Corp., North Chicago, Ill.
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DRUMS—Vulcanizing
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Trauwood Engineering Co., Cleveland, Ohio.

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Electric Furnace Co., Salem, O.
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Electric Furnace Co., Salem, O.
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FURNACES—Non-Oxidizing
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Electric Furnace Co., Salem, Ohio
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
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Electric Furnace Co., Salem, Ohio

FURNACES—Salt Bath
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Norton Co., Worcester, Mass.

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Oakite Products, Inc., New York, N. Y.
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Standard Industrial Compounds Co., Chicago, Ill.

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New England Butt Co., Providence, R. I.
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Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

WHERE TO BUY, Continued

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Robinson Mfg. Co., Muncy, Pa.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.

WHERE TO BUY, Continued

Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

PICKLING TANK LININGS—
Keagler Brick Co., Steubenville, Ohio.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

QUENCHING BATH CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery Co., Cleveland, Ohio
Robinson Mfg. Co., Muncy, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Standard Industrial Compounds Co., Chicago, Ill.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Keagler Brick Co., Steubenville, Ohio.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE DRAWING—High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Music
Jersey Steel & Wire Corp., Irvington, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

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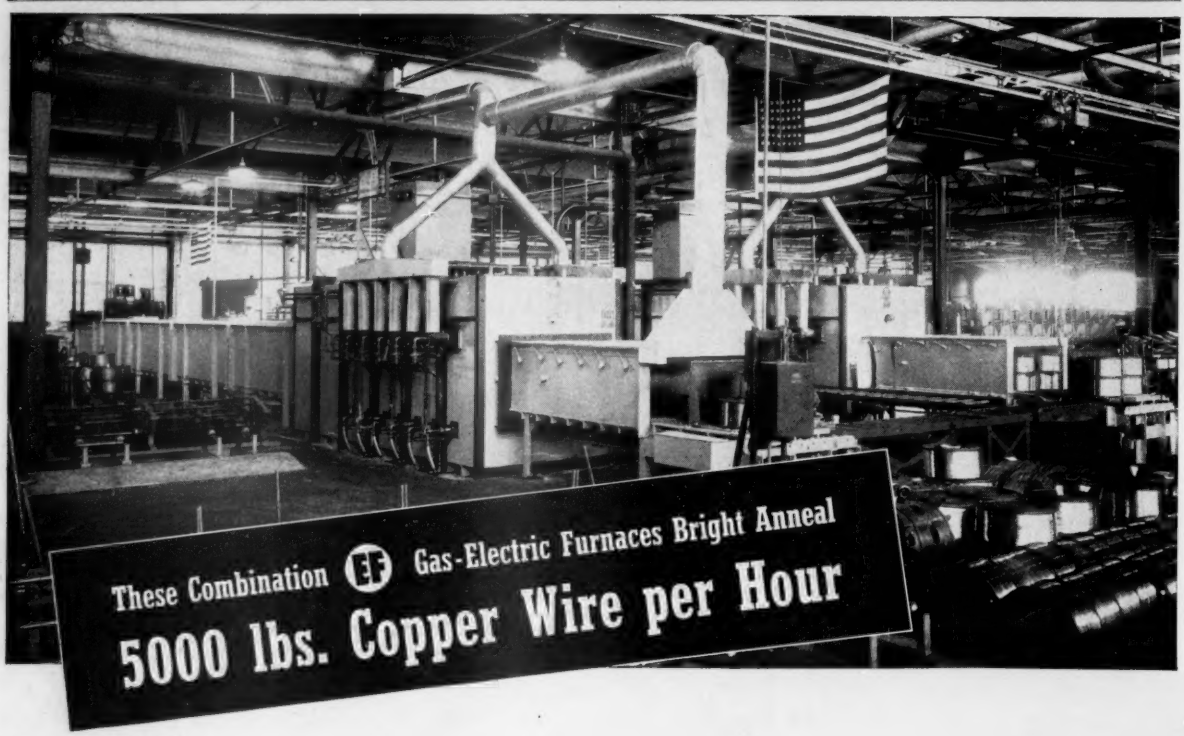

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